FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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DIARY OF FORTHCOMING EVENTS.

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

June 22 ...	Wilbur Wright Memorial Lecture, H.R.H. Prince Albert presiding, at 8.30 p.m., at Central Hall, Westminster. Commander J. C. Hunsaker will read a paper on "Naval Architecture in Aeronautics"
July 3 ...	Air Tournament at London Aerodrome, Hendon, in Aid of R.A.F. Memorial Fund
July 9 to 20	S.B.A.C. International Aero Exhibition at Olympia
July 17 to 31	Seaplane Contests at Antwerp
July 24 ...	Aerial Derby at Hendon
Aug. 3 ...	Air Ministry Competition (Large and Small Type Aeroplanes)
Aug. 28 & 29	Schneider International Race, Venice
Sept. 1 ...	Air Ministry Competition (Seaplanes)
Sept. ...	International aviation week (with competitions) at Brescia, Italy
Sept. 27 to Oct. 2	Gordon-Bennett Aviation Cup, France
Oct. 23 ...	Gordon-Bennett Balloon Race, Indianapolis, U.S.A.

EDITORIAL COMMENT

The Need for Research

THE abstract, published in another part of this issue of FLIGHT, from the paper read by Sir Richard Glazebrook before the Royal Aeronautical Society last week, emphasises the need that exists for continuous research work in connection with aircraft development. We have no space in which to traverse the paper in its details, even if that were necessary, and as, moreover, the abstract we give is very full, the interested reader will be able to gather for himself as much as we could possibly tell him. The main point which this paper does drive home is that, although much has been accomplished during the comparatively short time that has elapsed since the problems of dynamic flight were first solved in all their initial crudity, there still remains a vast amount of research and scientific work to be done towards perfecting aerial navigation.

It may be an axiom that there is no finality in anything human, but even so it is a fact which is too little appreciated save by those to whose lot it falls to carry out the work of investigation without which there can be no scientific progress. Even those who are concerned with the practical side of aviation have a habit of taking things for granted, and are apt to imagine that the improvements which are made almost from day to day merely happen; that they do not result from the patient evolution of the finished whole from perhaps the merest germ of an idea. It is only when they are able to follow in cold print such a record of research and scientific application as that set forth in Sir Richard Glazebrook's paper that they are really able to appreciate what the practical side of the industry owes to the scientist.

In so far as concerns the many points touched upon in the paper, there is just one to which we should like to make a passing reference. The author expresses the hope that aeronautics will find some place in the curricula of many of our engineering schools. We endorse that hope, and go a step farther by suggesting that it should be included as a part of the studies laid down in all the engineering schools and colleges of the country. That will take time, and it will cost money, but we are convinced that it is worth

while undertaking the trouble and that the money will be well spent, since it is as certain as that night follows day that in the future aerial navigation, which is dependent upon the evolution of the best types of aircraft, will be the principal means of rapid communication between the nations.

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Cranwell as a Flying School

In the White Paper devoted to the Air Service Estimates there appeared an item of £300,000 for the construction and equipment of a school for the instruction of future flying officers. This is not at all to be confused with the estimates for the training establishment at Halton, near Tring, which is a centre to be devoted to training non-commissioned ranks. It has now been allowed to transpire that the flying officer of the peace-time Royal Air Force is to be trained at the great aviation station at Cranwell, which it may be remembered was one of the largest of the R.N.A.S. training grounds prior to the fusion of the two air services. Generally speaking, the announcement that a first instalment of £300,000 is to be expended on the conversion of the aerodrome and the replacing of temporary buildings with permanent structures, has been received by the Press with approval. Aviation during the War took a very firm hold of the popular imagination—as well it might, particularly in those parts of the country which were continually subjected to attack by the enemy's aircraft. Thus a wide realisation has resulted of the basic fact that it would be the falsest of false economy to stint the Air Force of the money necessary to maintain the lead in the air with which we finished the War. We have no desire to be accused of undue repetition of the conviction we hold, in common with all who know anything about the potentialities of aircraft in the next great war, that it is vital to our safety as a nation and as an Empire that we should be prepared and remain prepared for aught that might befall. Yet in this present connection it is necessary to point the moral that by spending this money now we are simply paying an insurance premium, and a very moderate one, for the sake of future security. We are to the full as anxious as any that true economy should be the order of the day, yet in this case we, as taxpayers no less than as advocates of aerial development, welcome the expenditure, and can only wish that the nation's finances permitted an even swifter progress than the limitations of the present year's Estimates will allow. What is being done at Cranwell and at Halton shows that there is at any rate a "certain liveliness" in the military branch of the Air Ministry, and that there is a decided inclination apparent to keep the Air Force up to the high standard of efficiency which obtained during the War.

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Wireless and Aircraft

The experiments which have recently been carried out by the *Daily Mail* in long-distance wireless telephony are not only of surpassing interest from the point of view of the easy and certain circulation of news, but they open up a perfect vista of possibilities in many other directions. There is only one of these that directly concerns us at the moment, and that is the application of this latest development of modern science to the purposes of aerial navigation. It has been an open secret for a long time that the wireless telephone was used with considerable success during the War, but little as we heard of its possibilities then, we have not been vouchsafed very much more since, owing to the monopoly of the Post Office and the reluctance of the postal authorities to grant licences for the transmission of news by wireless telegraph or telephone. It is easy enough now to get permission to install a receiving set, but sending is quite another matter. In the case of the *Daily Mail* experiments, the licence given by the Postmaster-General limited them to a duration of twenty minutes. Not the least interesting part of the experiment was a conversation with the passengers in a D.H. 6 flying over the Thames, which was quite successful.

The main thing which seems to us to fall to be discussed is this question of the Post Office monopoly of all methods of news transmission. It seems obvious that if aerial navigation is to depend upon the use of directional wireless, this monopoly will have to go when the time arrives that it has come to anything approaching a high state of development. It is not because we have any hostility to the Post Office, or that we fail to realise how important it has been from the point of view of the public that the State should have a monopoly of the mails and the telegraphs. It would never have done to have left these to the chaotic conditions which obtained when the mails were carried by private contractors, responsible to no one but themselves for the safety of important documents and correspondence. Nor could the telegraphs have been developed by private enterprise as they have been by the State. It might be argued that in the administration of the telephones the Post Office has not shown conspicuous ability or foresight, but in justice to the department, it must not be forgotten that the circumstances under which the State took over the telephone enterprise were such as to make it very certain that the latter was not all it would have been had the National Company not been working with the knowledge that at the end of a particular term the Post Office would inevitably assume control.

The development of wireless, however, puts an entirely new complexion on matters, and we cannot see how the Post Office can hope to retain a monopoly and refuse licences to operate. After all, the Post Office as a Department of State exists for the general convenience of the public. Up to the present, its monopoly has certainly operated for that convenience, but the moment a new set of conditions arises in which monopoly militates against the best interests of the community, it is perfectly obvious that the monopoly must go. We submit that such a new set of conditions is at hand, even if it has not already arisen, and that the time is here when the question of a retention of a monopoly in wireless transmission must be very seriously considered with a view to its removal, or at least its very drastic modification. Aviation and wireless are naturally allied, and *must* progress side by side.

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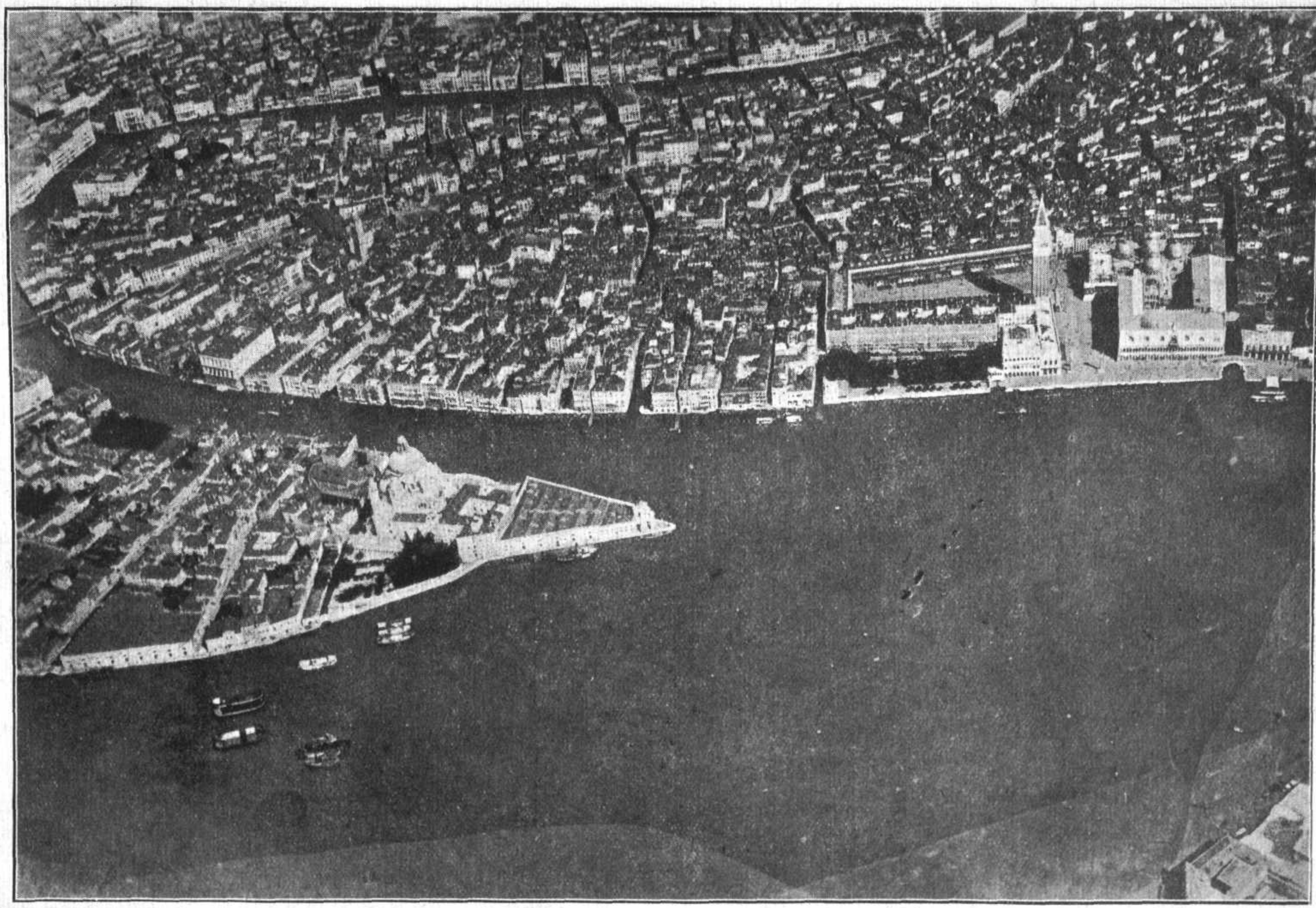
The War Museum

The War Museum at the Crystal Palace, which His Majesty will open in state on Wednesday of next week, will necessarily be of extraordinary interest to everybody, whether or not the individual may have been concerned in the Great Adventure, and we doubt not will be visited by all who have or can make an opportunity. It has been a good thought of the Government to collect together



VENICE, AS SEEN FROM ABOVE : The venue of the next Schneider International Trophy Competition

under the roof of the great Sydenham building relics and mementoes of the War which give a graphic idea of the great struggle and the progressive improvement in weapons and munitions of war which resulted. Nor can the sentimental side be ignored, and the relics of the battlefields, each with its own moving story of heroism and suffering, will make a telling appeal to the imagination.

The Royal Air Force is well represented in the Museum. There are many personal souvenirs of famous fighting airmen, both British and German. There are parts of the machine which Major McCudden was flying when he came by his death, side by side with relics of Capt. Ball, including a part of the S.E. 5 machine flown by the latter when he was shot down. The enemy is represented by portions of the machine of Baron von Richthofen, including the engine and rudder. Also there are portions of the "Albatros," flown by an almost equally famous enemy airman, Capt. Voss, when he was brought down in aerial combat by Lieut. Rhys Davis in 1917. These are but a few of the aerial relics of the War, mentioned by the way to indicate that the Museum is not merely a collection of war material gathered together for the simple purposes of exhibition, but of poignant personal interest and appeal to the imagination of the people. The Museum will, we doubt not, be the most popular show-place of the year, especially in view of the impressive inauguration which will take place on Wednesday next.

AIR COMMODORE GROVES KILLED

It is with the greatest regret that we have to record that Air Commodore R. M. Groves, C.B., R.A.F., while piloting a Bristol fighter aeroplane at Almaza, Egypt, met with an accident and received injuries to which he succumbed in hospital later. Flying Officer C. O. Bird, of No. 70 Squadron, who was a passenger on the machine, was killed.

From an account to hand it appears that Air Commodore Groves, who intended to fly to Kantara with Flying Officer Bird as observer, took off without anything unusual occurring, and climbed 100 or 150 ft. when the engine failed. He turned in the endeavour to land in the aerodrome, but the machine became temporarily uncontrollable, and the altitude was insufficient to enable him to recover before the machine nose-dived and crashed to earth. Although help was immediately forthcoming there was a difficulty in extricating the airmen. Flying Officer Bird was already dead and the pilot died two hours later.

Three hundred officers and men of the Royal Air Force and a large gathering of civilians attended the military funeral of Air Commodore Groves on May 29. The coffins were covered with the Union Jack, and innumerable wreaths were carried on trailers drawn by tenders. The principal mourners, in addition to the Air Staff, included representatives of the Sultan and Lord Allenby, and also Sir Paul Harvey, Financial Adviser to the Egyptian Government, while detachments from all the regiments and services in Cairo completed the procession.

Air Commodore Groves, who had been Deputy Chief of the Air Staff for a considerable time, had gone to Egypt to take over the command of the R.A.F. in Egypt and the Middle East during the absence of Air Vice-Marshal Sir William Salmond in Mesopotamia.

He recently completed his 40th year, had had a very distinguished career in the Navy and the Air Force. At the outbreak of war he was one of the leading wireless officers at the Admiralty, which transferred him to the Air Service. He commanded airships and subsequently held several important positions under the Air Board, becoming Deputy Chief of the Air Staff and more recently Acting Chief of the Air Force in the Middle East. He had a great hand in helping to establish the R.A.F. as it is to-day, and his death must be regarded as an irreparable loss.

Sir H. M. Trenchard

The following announcement appeared in a supplement to the *London Gazette* on May 26 :—

"Maj.-Gen. (Air Vice-Marshal, R.A.F.) Sir H. M. Trenchard, Bart., K.C.B., D.S.O. (now Air Marshal, R.A.F.), resigns his commission and is granted the hon. rank of Maj.-Gen. in the Army whilst holding the appointment as Col. R. Sc. Fus. (Aug. 1, 1919)."

Somewhat belated, this is merely the formal Army announcement that Sir H. M. Trenchard had changed over from the Army to the R.A.F. permanently.

Seaplanes as Ships

It should be noted that seaplanes entering a port are classed as ships. Seaplanes going from England to France must therefore land at Dunkirk, Calais, Boulogne, Tréport, Dieppe, Havre, Caen, Cherbourg, or Saint-Malo for Customs examination.

France Loses Two Airships

March 21 was a bad day for the French airship service. The new airship AT 18 which was on a long-distance cruise, came into contact with some tall trees near Etienne, during a fog, with the result that the nacelle was destroyed and the envelope had to be hurriedly deflated. Fortunately the crew escaped injury.

On the same day while the AT 9 was being tested at Toulon, preparatory to cruising across the Mediterranean to Algiers, the airship caught fire and was partly destroyed. Here again the crew were lucky to escape.

The Italian Transatlantic Airship

The B 34, the airship which has been built in Italy with the object of making a trip from Rome to Buenos Ayres, was taken out for a brief trial flight on the morning of May 25, but no details of the results obtained are available. The airship, the envelope of which has a capacity of 50,000 c.m., has an aluminium gallery, in place of the usual nacelle, which is said to be capable of accommodating comfortably 100 passengers.

Air Mail Service in the U.S.

According to Col. J. A. Jordon, Chief of Construction and Extension of the U.S. Air Mail Service, Omaha, 300 miles S.W. of Chicago, is to become, within two years, a base depôt for 500 air mail 'planes.

Each of the 'planes to be used in the New York—San Francisco mail service and the radiating branches is to be so constructed that within a day it could be transformed into a fighting machine.

"Omaha has been designated for the base because of its topographical conditions and its central location," says Col. Jordon. "In case of trouble a battle 'plane converted at Omaha could reach the coast or border in from 15 to 20 hours."

Col. Jordon, who is on an inspection tour of landing fields, predicts that within a year mail will be transported from coast to coast in 36 hours.

The Ariel Transport Corporation will begin in July a mail express line between New York and Chicago, the system being extended later to Omaha and San Francisco. The machines will be picked from the surplus 3,000 British planes left over from the war. The operating officials will include Lieut.-Com. Bellinger, who commanded the N.C.1 in the Transatlantic flight.

Air "Taxis" in Canada

"Seventeen aerial taxicab companies are being formed in Western Canada, and a number of these have already been licensed by the Air Board," reports the *Daily Mail* correspondent in Montreal. Four commercial flying companies have been formed at Winnipeg, and there are companies at Regina, Moose Jaw, Saskatoon, Edmonton, Hanna (Alberta), Calgary, Lethbridge, Banff, and in Vancouver. Aerodromes are to be built at Virden and Vancouver.

"Passenger flying is the first object of these companies, and mail carrying and distribution for large shops is expected to follow."

AIR MINISTRY NOTICES

Flying at Epsom Races

IN view of the large crowds which are expected to attend the Epsom Race Meeting this week and especially on June 2 during the running of the Derby, the attention of pilots is drawn to Clause 5 Section (2) (*b*) and (*c*) (General Safety Provisions) of the Air Navigation Regulations, 1919, which prohibit the carrying out of any trick or exhibition flying over any race meeting or the carrying out of any flying which by reason of low altitude or proximity to persons or dwellings is dangerous to the public safety.

In order to prevent interference with the racing and also any accidents to the public, pilots should avoid flying over or near the race course within an area of 2 miles from the Epsom Grand Stand unless they do so at a height of not less than 6,000 ft.

Any infringement of the Regulations will be dealt with rigorously. (A.M. Notice to Airmen No. 57.)

Aerodromes and Landing Grounds

THE following amendments have been made to the consolidated list of Aerodromes issued on April 22, 1920 :—

LIST B.—*Service Stations also available for civil use.*

The following aerodrome has been deleted :—

Aerodrome.	Nearest railway station.	Nearest large town.
Didsbury ..	.. Didsbury	.. Manchester.

LIST C.—*Stations temporarily retained for service purposes.*

The following aerodromes have been deleted :—

Brockworth	.. Gloucester	.. Gloucester.
Tadcaster ..	.. Thores ..	.. Tadcaster.

LIST D2.—*Licensed Civil Aerodromes.*

The following aerodromes are published as additions :—

Eastbourne..	.. Eastbourne	.. Eastbourne.
Didsbury* ..	.. Didsbury..	.. Manchester.

* No facilities exist at present.

LIST D3.—*Aerodromes Licensed as "Suitable for Avro 504K and similar Types only."*

Except in very few cases accommodation does not exist. The licences have been issued for limited periods only.

The following aerodromes are published as additions :—

Sands, Seaton Carew.	Seaton Carew	.. West Hartlepool.
Northampton, Mill Road.	Northampton	.. Northampton.
Macclesfield, Congleton Road.	Macclesfield	.. Macclesfield.
Brean Down, Weston-super-Mare.	Bleadon ..	.. Weston-super-Mare.
Gleneagles ..	.. Gleneagles	.. Perth.

International Aeronautical Relations with Germany.

THE effects of International Aeronautical relations on the Peace Treaty with Germany.

Terms affecting Flights over Germany.—Now that the ratifications of peace have been exchanged and peace between Germany and this country exists, British aircraft have full liberty of passage over and landing in the territory and territorial waters of Germany and enjoy the same privileges as German aircraft (Peace Treaty, Article 313). They also, while in transit to any foreign country, enjoy the right of flying over German territory and territorial waters without landing (P.T. 314). All aerodromes in Germany open to national public traffic are also open for British aircraft which as regards charges in such aerodromes shall be treated on a footing of equality with German aircraft (P.T. 315). The above rights are subject to the observance of such regulations as may be made by Germany, but these must be applied equally to German aircraft (P.T. 316). All certificates of nationality, airworthiness, etc., issued or recognised as valid by this country must be recognised as valid in Germany (P.T. 317). As regards internal commercial air traffic, British aircraft enjoy in Germany most-favoured-nation treatment.

Terms affecting the International Air Navigation Convention:—Germany undertakes to enforce the necessary measures to ensure that all German aircraft flying over her territory shall comply with the rules as to lights and signals, Rules of the Air, and Rules for Air Traffic, on and in the neighbourhood of aerodromes as laid down in the Convention (P.T. 319). The above obligations, including those under the first heading are to remain in force till January 1, 1923,* unless by that time Germany has been either admitted to the League of Nations or authorised by consent of the Allied and Associated Powers to adhere to the Convention (P.T. 320). By Article 42 of the Convention, Germany may adhere to the Convention (1) either on becoming a member of the League of Nations† or (2), until January 1, 1923, if adhesion is approved by the Allied and Associated Powers signatory to the Peace Treaty, or (3) after January 1, 1923, if adhesion is agreed to by at least three-fourths of the States signatory and adhering to the Convention. Meanwhile, in accordance with Article 5 of the Convention, German aircraft are precluded, as being aircraft of a non-Contracting State, from flying over the territory of the Contracting States.

Other Provisions.—For six months after coming into force of the Treaty, the manufacture and importation of aircraft and their parts and of aircraft engines and their parts is forbidden in German territory (P.T. 201), *i.e.*, until July 10 next. The armed forces of Germany must not include any military or naval air forces (P.T. 198) which must be demobilised within two months of the coming into force of the Treaty (P.T. 199), while all military and naval aeronautical material must be delivered up (P.T. 202). No dirigible is to be kept (P.T. 198).

* Article 200, however, provides that until the complete evacuation of German territory by the Allied and Associated Powers, their aircraft shall enjoy in Germany freedom of passage through the air, freedom of transit, and of landing.

† Germany may be admitted to the League by the vote of two-thirds of the Assembly consisting of Representatives of the Members of the League. (*Communiqué* No. 575.)

Issue of Meteorological Reports by Wireless Telegraphy

IT is hereby notified :—

1. On and after June 1, 1920, the following meteorological reports will be issued for general use, in addition to the hourly reports which are at present issued primarily for the Aviation Services between London and the Continent (M.O. 2622).

2. *Synoptic Telegrams* in the same code as hitherto used (M.O. 2630) will be issued at :—0315 G.M.T. ; 0845 G.M.T. ; 2015 G.M.T. (NOTE.—The 0845 G.M.T. message takes the place of the message previously issued at 0915 G.M.T.)

3. *General Inferences* in plain language based upon observations at 0700 and 1800 G.M.T. will be issued at :—0915 G.M.T. ; 2000 G.M.T.

4. The following is an example of such an inference :—

"Pressure has again become high over Iceland and a deep depression over the Skager-Rack region is increasing in intensity. The resultant North-Westerly to Northerly wind current over the British Isles will maintain rather cold weather with local showers and variable skies during the next day or two."

5. These issues will be made from the Air Ministry Wireless Station, call sign, G.F.A. ; wave length, 1,400 metres (C.W.).

6. *Synoptic Telegrams* issued at 0230 and 1430 G.M.T. from Aberdeen Wireless Station will continue unaltered, call sign, B.Y.D. ; wave length, 3,300 (C.W.). (Notice to Airmen No. 58.)

Aerial Lighthouse at Bron

AN aerial lighthouse has been installed at the south-eastern boundary of Bron Aerodrome (Lyons) in a position approximately 45° 44′ North Latitude, 4° 53′ East Longitude. This lighthouse exhibits a green light and flashes the letter "H" of the Morse Code once every $7\frac{1}{2}$ secs. thus :—flash $\frac{1}{2}$ sec., eclipse $\frac{1}{2}$ sec. ; flash $\frac{1}{2}$ sec., eclipse $\frac{1}{2}$ sec. ; flash $\frac{1}{2}$ sec., eclipse $\frac{1}{2}$ sec., flash $\frac{1}{2}$ sec., eclipse 4 secs. The light is in operation daily from sunset to 21 hours (9 p.m.) (summer time). (Notice to Airmen No. 59.)

Aero Exhibition, Olympia

THE ROYAL AERO CLUB has undertaken the organisation of the Inventions and Model Section of the Sixth International Aero Exhibition to be held at Olympia, July 9 to 20, and the Club will be glad to receive entries for this Section.

Anyone with inventions or models appertaining to aircraft is requested to communicate with the Secretary, Royal Aero Club, 3, Clifford Street, London, W. 1.

Cricklewood Aerodrome Award

MR. EDWIN SAVILL, the arbitrator appointed to settle the claim of the Ecclesiastical Commissioners for £43,575 against the M.O.M. for the compulsory acquisition of the land on which the Cricklewood Aerodrome is built, has issued his award, the amount of purchase money and compensation to be paid by the Ministry of Munitions being £31,320. It being arranged that the question of costs should not be dealt with in the award, this is reserved for further consideration.

NOTES ON FLYING BOAT HULLS

By Major LINTON HOPE, M.I.N.A., F.R.Ae.S., Consulting Naval Architect to H.M. the King of the Belgians and to the Air Ministry.

(Concluded from page 572.)

Beam.—The proportion of beam is one of the most important items in the design. With small beams, as in the A.D. boats, with nearly $7\frac{1}{2}$ beams to length, the chines are deeply submerged and the boat is often "dirty," but she should alight on the water with little disturbance, and the hull is stronger, lighter and more compact than such examples as Curtiss boat of about four beams to length.

Too much beam tends to increase the alighting shock very considerably, and increases the stresses on the hull, not only by the increase of shock, but even more by the tendency of the wide fins to buckle up, and strain the bottom, and also the sides of the hull where the fin-top joins it. In addition the increase of weight is considerable, especially if the hull is strengthened to withstand the extra strains. For these reasons it is fairly obvious that beam should be kept as small as possible, provided there is sufficient for planing efficiency and seaworthiness, and for this purpose the writer, with the assistance of his staff, during the latter part of the War, has endeavoured to produce, from the large number of examples available, an empirical formula which will give a fairly correct proportion of beam for a given weight in this formula $\beta = K\left(\frac{W^2}{P}\right)^{C}$. K is a **constant** which fixes the *proportion of beam for a given weight,* while the coefficient C indicates the power required to increase the *amount of beam to the other dimensions* as the weight increases.

The accompanying table shows how the alteration of the power C varies the proportionate increase of beam for very considerable differences in weight. The beam β is the *effective beam* at the step, and represents the extreme beam obtained at the step multiplied by a lift coefficient. This is the cosine squared of the traverse angle of the bottom to the horizontal, *e.g.*, a flat bottom with a transverse angle of O° would have a lift coefficient of 1·0, while a V bottom, with an angle of about 20°, would have, say, 0·883 lift coefficient. It should, however, be understood that in the case of a curved or hollow section the curve must be divided into a number of parts to obtain the varying angles, and each of these must be treated separately to arrive at the mean lift coefficient of the whole. This coefficient of $\cos^2$ has been arrived at after many years' experiments, and appears to give much more accurate results than the sine of the vertical angle which was formerly supposed to be correct.

Beam Formula.—Effect on β of Variation of the Power C and the Constant K.

No. in Formula Table.	No. in Data Table.	Dimensions and Weights of Boats. Length over all. (ft.)	Weight. (lbs.)	Breadth over all. (ft.)	β = effective breadth for formula. (ft.)	C = ·33 K = ·1086 (ft.)	C = ·37 K = ·0666 (ft.)	C = ·41 K = ·0412 (ft.)	C = ·45 K = ·0253 (ft.)
5	10	30·0	3,422	4·00	3·88	β=4·07	β=3·88	β=3·71	β=3·29
6	16	28·0	4,600	5·00	4·55	β=4·69	β=4·55	β=4·33	β=4·29
7	17	45·0	11,600	7·50	5·96	β=5·96	β=5·96	β=5·96	β=5·96
13	19 at 32,400 lbs.	60·0	32,400	11·50	8·95	β=8·57	β=8·94	β=9·36	β=9·77
15	—	84·0	72,000	14·00	12·69	β=11·70	β=12·60	β=13·79	β=14·92
17	No. 17 Double size	90·0	96,000	15·00	14·12	β=12·83	β=14·10	β=15·52	β=17·00

A Formula to Ascertain Beam (at step) for a Given Weight.
NOTE.—C may be varied from ·33 to ·45, *k* varying to suit.

$$\beta = \left(K\frac{W^2}{P}\right)^{\cdot 37}. \quad \beta.O.A. = \beta \div L.\ Coeff. \quad \beta = \frac{\left(\frac{W^2}{P}\right)^{C\ \cdot 37}}{15} \quad \text{or } k = \cdot 0666. \quad \beta = k\left(\frac{W^2}{P}\right)^{C\ \cdot 37}.$$

No.	L.O.A.	$\lambda = 2\sqrt[3]{W}$	W (lbs.) Total weight of machine.	P (b.h.p.)	B.O.A. (step)	L. Co. (lift coeff.)	B = B.O.A. × L. Co.	β (formula).	β.O.A. = $\frac{\beta}{L.\ Co.}$	Remarks. (B.O.A. is as designed in all cases.)	No. in data table.
1	26·16	26·24	2,260	100	3·25	1·000	3·25	3·689	3·689	B.O.A. probably too small; gets off badly.	4
2	24·00	28·64	2,934	200	3·50	·950	3·33	3·462	3·644	B.O.A. about right, but gets off rather badly.	3
3	33·00	35·30	5,500	180	8·00	·925	7·40	5·730	6·195	B.O.A. much too great, gets off very badly.	1
4	24·00	26·64	2,360	200	4·00	·840	3·36	2·948	3·501	B.O.A. probably too great, gets off quickly.	14
5	30·00	30·14	3,422	200	4·00	·938	3·75	3·881	4·138	B.O.A. slightly small, but form of rear step bad.	10
6	28·00 (34·46)	33·26	4,600	230	5·00	·912	4·56	4·547	4·986	B.O.A. correct, gets off very well	16
7	45·00	45·28	11,600	720	7·50	·885	6·64	5·962	6·737	B.O.A. probably too great, gets off easily.	17
8	45·00	45·78	12,000	720	7·50	·885	6·64	6·114	6·909	B.O.A. still a little too much	18
9	45·00	47·02	13,000	720	8·75	·883	7·73	6·486	7·357	B.O.A. much too great	7
10	45·00	47·50	13,400	720	8·75	·883	7·73	6·633	7·512	B.O.A. still too great	8
11	56·00	55·18	21,000	750	14·00	·975	13·65	9·110	9·344	B.O.A. very much too great, but gets off badly.	5
12	60·00	57·70	24,000	1,875	11·50	·812	9·33	7·164	8·823	B.O.A. too great, gets off very well	19
13	60·00	63·50	32,400	1,875	11·50	·812	9·33	8·945	11·016	B.O.A. about correct, but power rather low.	19A
14	64·00	63·50	32,000	2,400	9·50	·790	7·51	8·091	10·242	B.O.A. rather small, but model gets off well.	20
15	84·00	83·20	72,000	3,600	14·00	·878	12·29	12·690	14·453	B.O.A. about correct, model gets off well.	New designs (models only).
16	84·00	86·18	80,000	3,600	15·00	·880	13·20	13·720	15·600	B.O.A. as above, but a trifle small	New designs (models only).
17	90·00	91·58	96,000	4,800	15·00	·880	13·20	14·115	16·033	B.O.A. too small. This is No. 8 double scale.	New designs (models only).
18	96·00	92·84	100,000	4,800	16·00	·882	14·11	14·554	16·501	B.O.A. probably correct	New designs (models only).

Although the power C has been treated as a variable coefficient, this has been done because there are not sufficient flying boats of large size in existence to accurately determine the most suitable variation of the proportion of beam from very small to very large vessels, but when we have more experience of large boats we should be able to decide on a fixed power C for all sizes.

Referring to the foregoing table, it will be seen that K, for each variation of C, has been arranged to suit the 45 ft. example No. 7, as being midway between the smallest and largest and having proved highly satisfactory in use. With $C = \cdot 33$, the variation of beam for size is practically the same as that of the other dimensions, which vary as the $\sqrt[3]{W}$, although it is too large in the small boats and too small in the large ones. If, however, we take C as the $\cdot 45$ power, we get too much beam in the large boats and not nearly enough in the smaller ones. From this it is clear that the proper value of C will lie somewhere between $\cdot 33$ and $\cdot 45$. The table also shows the variation in K, which is required by the different values of C to give a close approximation to β for the standard example No. 7, and other medium-sized boats. It should be noted that example No. 17 has the same actual proportion of beam as example No. 7, of which she is an enlargement to twice the size, and this beam was found to be insufficient. It should be pointed out that, though only six examples are given, the formula has been evolved from the data of a very large number of boats and a few models, and in all the most successful examples the beam obtained from the formula closely approximates that of the actual boat.

The increase of the proportion of beam in the larger boats does not apply to the other dimensions, and length over all may be taken as $2\sqrt[3]{W}$ (*see* K in table) for the majority of the examples in the table of data with the exception of No. 16 (CE.1), the hull of this boat terminating in a transom at the rear step. The tail plane extended on booms instead of being fixed to the after end of the hull, which in other boats tapers to a vertical stern post aft of the rear step. As this portion of the hull is usually well above water it adds considerably to the longitudinal stability amid waves by providing a useful amount of surplus buoyancy aft, as in the case of the overhanging counter of a yacht. If, in the case of CE.1 we take $2\sqrt[3]{W}$, we get a length of 33·26 ft., which is very nearly in the same relation to the tail plane distance aft of C.G. as the after end of other boats with overhang. The length of their hull from stern post to the centre of gravity is entirely controlled by the aerial structure which fixes the position of the tail plane. CE.1, although slow in the air, got off the water very easily on trial.

A Simple Method of Designing

Before commencing a hull design the following data must be obtained: Maximum flying weight *which must not be exceeded by overloading*. Power, getting-off speed, the loading of the main planes, and the distance from the C.G. to after end of the tail plane. Let us assume that the getting-off speed is between 50 and 55 knots, the total weight 11,600 lbs., and the power 720 b.h.p. We first ascertain the length over all to be $2\sqrt[3]{W} = 45 \cdot 28$ ft., the beam across the step will be $\beta = K\left(\frac{W^2}{P}\right)^C$ ($K = \cdot 066$ and $C = \cdot 37$), lift coefficient $\cdot 883 = 7 \cdot 5$. The breadth of the main hull may be taken as about one-eighth of the length, and the depth as eight-sevenths to nine-eighths of the breadth, the main step of about 3 ins. depth should be placed at or near the C.G., and the angle of the planing bottom at the keel, forward of the step, should be $1\frac{1}{2}$ degrees to the datum line, or top of the hull in this form, which is the flying level. A general profile of the hull may be taken from Fig. 3, as this design has proved satisfactory both in the model trials and the actual boat. The draft at the step may be taken as about one-third of B, while the angle to the datum line of a tangent, drawn from step to step at the keel, should be not less than $7\frac{1}{2}$ to 8 degrees, while a similar tangent from step to step at the chine may be about 5 to 6 degrees. The lift coefficient, as already stated, is ·883, which gives rather more hollow to the planing bottom than Fig. 3, but a trifle less than Fig. 10. The breadth at the rear step would be ·25 of the main step, and its depth from chine to keel about ·44 of the main step. These figures for the rear step, however, may be varied by the designer, as they are merely the proportions chosen by the writer as having given good results.

The general form of the inner hull in the writer's designs conforms closely to that of the body of least resistance derived from the N.P.L. wind tunnel experiments for airships, except that the tail is drawn out as far as possible to obtain the necessary length between the tail plane and C.G. of the aerial structure. When speaking of these forms as similar it should be understood that the writer refers to the *curve of sectional areas* (Fig. 15) and not the lines, which vary with different forms of section. The greatest transverse section of the inner hull should be somewhere about one-third from the stem, and the upper part of the hull is semi-circular, which simplifies the designing and the

P.5 Weights and C.G. (No. 2).

		Weight in lbs.
Inner hull—		
Area of inner skin—cockpits mahogany at 36 lbs.	564 sq. ft. of $\frac{13}{64}$ in. at ·56 lb. per sq. ft.	316
Ordinary timbers, R. elm at 44	3,735 ft. of $\frac{1}{4}$ in. $\times \frac{5}{16}$ sp. 1·75	89
Floors, R. elm at 44 ..	$\frac{3}{8}$ in. $\times \frac{15}{32}$ in., $\frac{1}{4}$ in. $\times \frac{11}{32}$	30
Stringers, spruce at 30..	1 in. $\times \frac{1}{2}$ in. (26) and 4 big.	131
Keel and girder ..	.. ..	60
Stem at 44	1·5 sq. in. × 5·5 ft. ..	3
Hoops	·75 sq. in. × 5·4 ft. ..	60
Saddles	.. ..	29
Fastenings	.. ..	77
Fabric	At 70 sq. ft. to 1 lb. ..	8
Chocks, coambings, stern-posts, etc.	.. ..	55
Varnish	18 sq. ft. to 1 lb. (6 coats)	31
Sundries—paint, glue, etc.	.. ..	28
		917
	= 1·63 lb. per sq. ft. area.	
Fore planing bottom—		
Area, 127 sq. ft... ..	At $\frac{9}{32}$ in. and 38 sq. ft. of $\frac{6}{32}$ in.	128
100 timbers, elm ..	860 ft., $\frac{1}{4}$ in. $\times \frac{5}{16}$ in. ..	21
11 frames	At 1·5 sq. ft., $\frac{1}{8}$ in. 3-ply ·52 per sq. ft.	8
10 stringers	16 ft., $1\frac{1}{2}$ in. $\times \frac{1}{2}$ in. ..	21
Chines and fillets ..	.. ..	26
Fastenings	.. ..	24
Varnish	.. ..	7
Fabric	.. ..	3
Step	4 sq. ft. of $\frac{3}{4}$ in... ..	15
		253
	= 2 lbs. per sq. ft. area.	
After step—		
Skin area, 12 sq. ft. ..	.. ..	12
Chines and moulding ..	.. ..	6
Fastenings	.. ..	2
Step	.. ..	4
Sundries	.. ..	2
		26
Brass sheeting	.. ..	8
	Total weight =	1,202
	Side port covers,	15 lbs.

Actual weight: No. 2 = 1,281 lbs.; No. 1 = 1,393 lbs. (112 lbs. saved).
Steel fittings, 25 lbs.
Original estimate = 1,248 lbs.
Estimate of weight of P.5 wing roots = 176 lbs.
Weight of F.3 wing roots = 241 lbs.

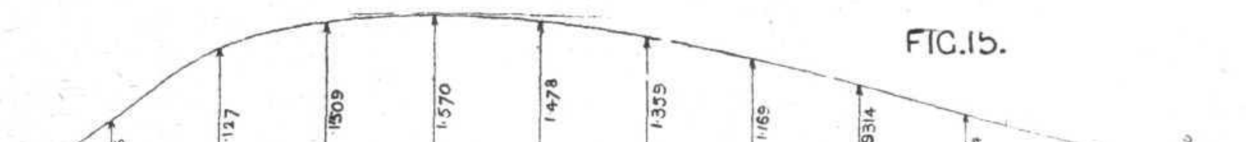


Fig. 15.—Curve of sectional areas of streamline body. Circular sections. Block Co. = 424, Prism Co. = 619

laying-off. With flexible construction the weight may be roughly assumed to be slightly under ·1 of the total flying weight, but of course a more correct estimate of the weight must be obtained when the design is far enough advanced to ascertain the skin area of the main hull and planing bottom. These areas are then multiplied by the weights per square foot given in the table of data for similar boats of approximately the same size. As the weight of the whole structure varies as the cube of the length, subject to a small correction for the variation of the proportionate increase of beam from small to larger boats, it is a simple matter to find the weight per square foot for various sizes. Although 10 per cent. of the total weight is given as a fair estimate of the hull, the examples in the table of data, such as No. 14 and No. 20, have hull weights of 9 per cent. and 9·3 per cent. respectively, but the hull of No. 14 was too small for the final weight of 2,340 lbs., having been designed for a maximum of 2,100 lbs. In the larger sizes it is possible to slightly reduce the proportion of weight of structure owing to the saving of weight of many details.

The accompanying (p. 591) estimate of weights of P.5 not only gives full details for a boat of this size, but also shows the work in detail.

Model Trials

It is most advisable when designing a flying boat hull—or, in fact, any form of vessel departing from the standard type—that a model should be run in one of the experimental tanks; not only to determine the resistance at varying speeds, but also to ascertain the performance of the model in the matter of wave making, "porpoising" (or longitudinal instability), and whether it will get off at the designed speed. Fig. 16 shows a series of model resistance curves got out by Major Bumpus, R.A.F., for a number of boats of various sizes, from the 45 ft. F.3 and P.5 of about 12,000 lbs. displacement, up to an 84 ft. model designed for 72,000 lbs. flying weight, of which three curves are shown loaded to 60,000, 80,000 and 100,000 lbs. All these curves are reduced to a common scale of resistance per 1,000 lbs. weight with a getting-off speed of 50 knots. Essential as they are, it should be borne in mind that tank tests only give results in smooth water. Consequently, due allowance must be made for sea conditions, and actual experience is quite as essential to the designer as model tests, which alone are insufficient.

Air Resistance of Hulls.—The following tables show comparative resistance in the wind tunnel of the F.3 and P.5, and one column also shows the latter with the angle between the main hull and the fin-top filled in to a fair curve. It will be seen that there was a slight advantage in this form at the lower speeds, but, at the highest speed, the difference is practically negligible. Various other models were tested in the same manner, and the resistance of CE.1 was lowest; but this model was the only one of the series in which the cockpits were not cut out. The model with the largest cockpits (which were cut well down the sides) had considerably greater resistance than any of the others.

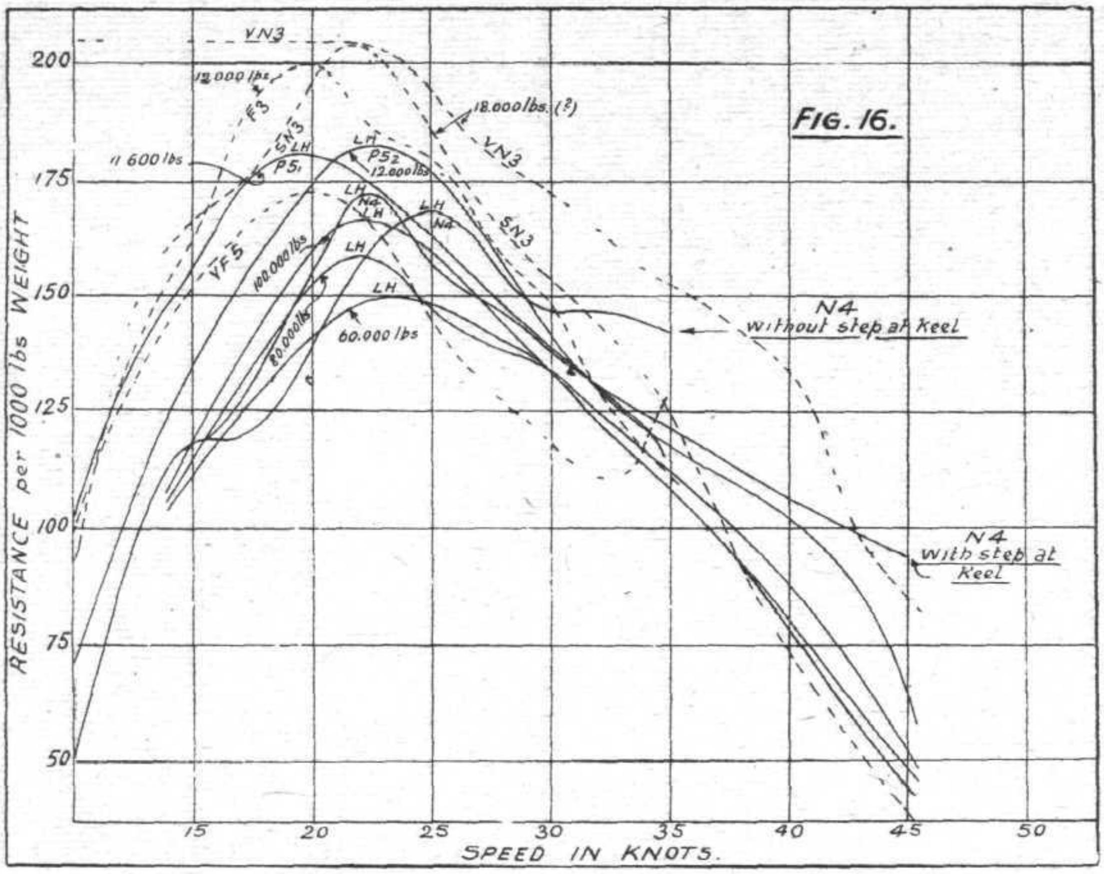


Fig. 16.—A set of model resistance curves

Resistance of Flying Boats in Wind Tunnel, N.P.L.

P.5 Experimental (model supplied).—The model was gouged in four places to a depth of about 0·15 in. to represent cockpits; the aft one was filled up with plasticine before commencing the experiments.

Table I gives the resistance (R in lbs.) of this model at different wind speeds. The coefficient $C = R/\rho V^2 A$ is also given where A is the maximum cross-sectional area of the model in ft², ρ the density of the air and V the wind speed.

Table II gives the resistance of a modified form of this model, viz., the F.E. experimental model, with the angle between the body and the chine filled in.

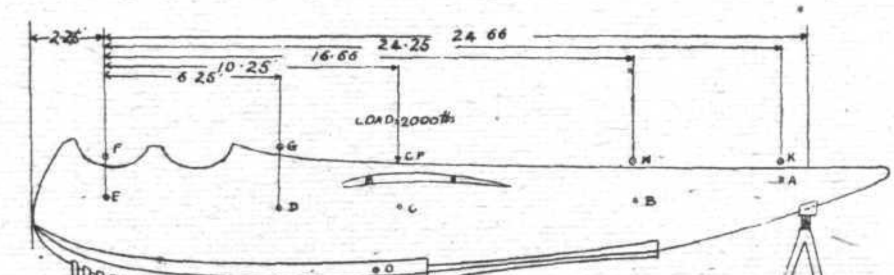


Fig. 17.—30-ft. AD boat under bending test

In determining the coefficients the same cross-sectional area as in Table I has been taken.

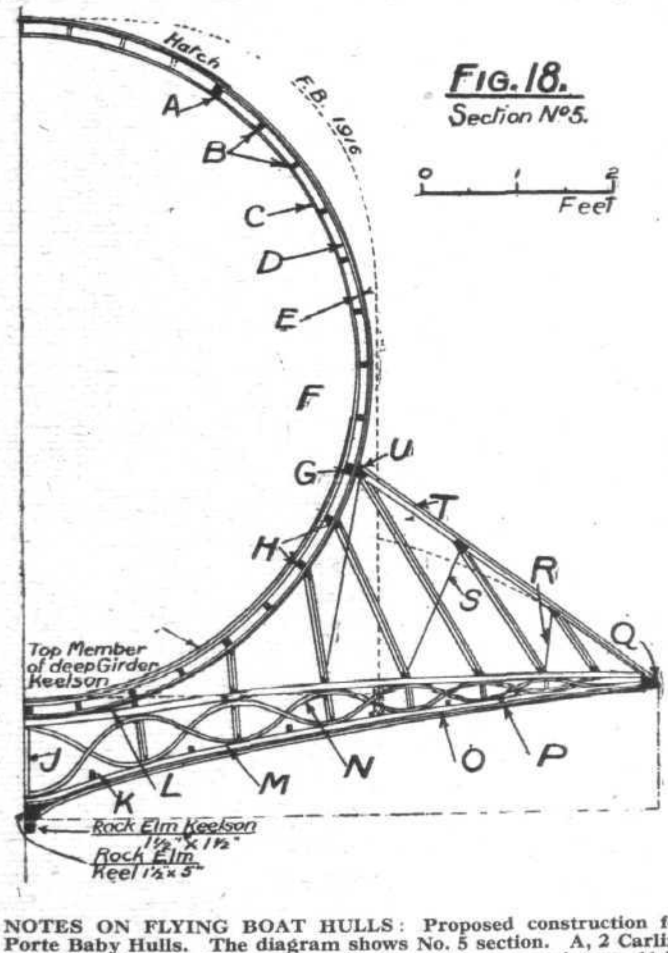
F.3 Model.—In Table III the resistance of F.3 model is given. This model was made at the N.P.L.

	TABLE I. P.5.		TABLE II. P.5 (filled-in angles).		TABLE III. F.3.	
Wind speed ft./sec.	R lbs.	$C = \frac{R}{\rho AV^2}$	R lbs.	$C = \frac{R}{\rho AV^2}$	R lbs.	$C = \frac{R}{\rho AV^2}$
20	·0139	$7 \cdot 12 \times 10^{-2}$	·0130	$6 \cdot 63 \times 10^{-2}$	·0197	$7 \cdot 55 \times 10^{-2}$
25	·0218	7·14	·0206	6·73	·0292	7·29
30	·0313	7·11	·0292	6·61	·0421	7·16
35	·0421	7·03	·0394	6·56	·0570	7·12
40	·0549	7·00	·0509	6·50	·0735	7·03
45	·0678	6·82	·0640	6·45	·0922	6·96
50	·0815	6·64	·0785	6·41	·1134	6·94
55	·0977	6·59	·0938	6·32	·1368	6·92
60	·1150	6·52	·1113	6·32	·1622	6·90
70	·1566	6·52	·1529	6·36	·2166	6·77
80	·2016	6·42	·1998	6·36	·2800	6·68
	A=0·207 sq. ft.		A=0·207 sq. ft.		A=0·276 sq. ft.	

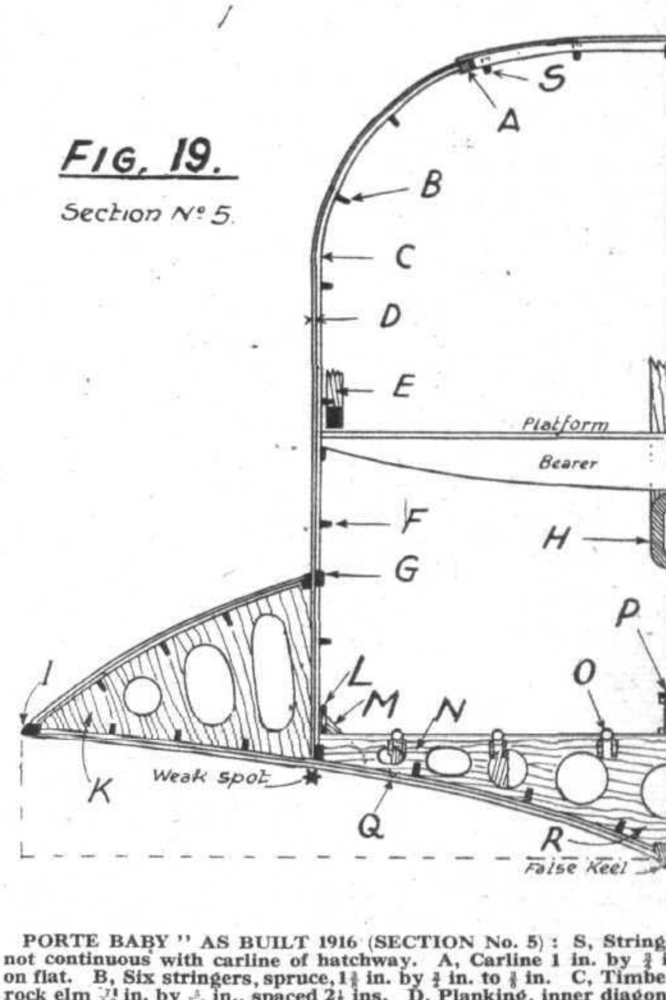
load. A further crushing test was carried out with the boat turned bottom up on a sand bed, and a special cradle, made to fit the planing bottom, was loaded with shot-bags over the C.G. until the hull showed signs of collapsing. This only occurred when the sand bed forced in one side of the cockpit, breaking one of the internal hoops and cracking some of the small bent timbers.

The planing bottom was not apparently distorted in any way, none of the seams showing the slightest sign of any movement. The load amounted to 13,800 lbs., which works out at about 8·8 lbs. per sq. in. over the whole loaded area, and nearly 17 lbs. per sq. in. on the actual surface of the cradle in contact with the load. Fig. 18 shows an elaborate form of flexible hull which is too costly for use, but, as the figures on the drawing show, the strength of this form of floor was about double that of the "Porte Baby" (Fig. 19) of the same size and weight.

In conclusion, the writer would again emphasise the extremely short time available for preparing this paper, and asks the indulgence of those present for its many shortcomings, both as to the checking of figures and hasty composition, also for dealing chiefly with his own designs; but it was considered that known facts and data would probably be of more value than vague figures of other boats, which in many cases could not be checked.



NOTES ON FLYING BOAT HULLS: Proposed construction for Porte Baby Hulls. The diagram shows No. 5 section. A, 2 Carline stringers, $1\frac{1}{8}$ in. by $\frac{3}{4}$ in. spruce. B, 26 small spruce stringers, $1\frac{1}{8}$ in. by $\frac{7}{16}$ in. C, Rock elm inner hoops, $\frac{3}{4}$ in. by $\frac{3}{8}$ in. D, Rock elm timbers, $\frac{5}{16}$ in. by $\frac{7}{16}$ in., spaced $2\frac{1}{2}$ ins. E, Planking mahogany; inner skin $\frac{3}{32}$ in., outer skin $\frac{1}{8}$ in.; varnished fabric between. F, Spar struts (not shown in diagram), bent rock elm hoops and spruce filling chocks. G, 2 bilge stringers, spruce, $1\frac{1}{8}$ in. by $1\frac{1}{4}$ in. H, Four medium stringers, spruce, $1\frac{1}{8}$ in. by $\frac{5}{8}$ in. I, Rock elm floors, $\frac{5}{8}$ in. by $\frac{3}{4}$ in., spaced 12 ins., tapering at ends. J, Bent rock elm intercostal keelson girders, $\frac{5}{8}$ in. by $\frac{1}{2}$ in. K, Lower stringers, $1\frac{1}{8}$ in. by $\frac{5}{8}$ in. and $\frac{3}{8}$ in.—reduced to outer stringer. L, Top member of transverse floor girder of rock elm, $\frac{3}{4}$ in. by 1 in. to $\frac{5}{8}$ in. by $\frac{5}{8}$ in., spaced 12 ins. M, Bottom member of floor girder similar to top. N, Bent strutting of transverse floor girders of rock elm, $\frac{1}{2}$ in. by $\frac{1}{2}$ in. to $\frac{3}{8}$ in. by $\frac{3}{8}$ in. O, Rock elm bent timber $\frac{5}{16}$ in. by $\frac{7}{16}$ in., spaced $2\frac{1}{2}$ ins. P, Bottom planking mahogany, two inner diagonal skins $\frac{3}{32}$ in., one outer fore and aft skin $\frac{1}{4}$ in. Q, Rock elm chine, 2 ins. by 2 ins. R and S, Silicon-bronze tension wire. T, Spruce strut. U, Fin stringer rock elm, $1\frac{1}{2}$ in. by $1\frac{1}{2}$ in.



PORTE BABY" AS BUILT 1916 (SECTION No. 5): S, Stringer not continuous with carline of hatchway. A, Carline 1 in. by $\frac{3}{4}$ in. on flat. B, Six stringers, spruce, $1\frac{1}{8}$ in. by $\frac{3}{4}$ in. to $\frac{5}{8}$ in. C, Timbers rock elm $\frac{7}{16}$ in. by $\frac{5}{16}$ in., spaced $2\frac{1}{2}$ ins. D, Planking, inner diagonal $\frac{3}{32}$ in. mahogany, outer fore and aft $\frac{3}{16}$ in. cedar. F, Diagonal strut, spruce, $1\frac{3}{4}$ in. by $1\frac{3}{4}$ in., let into stringers. F, Stringers cut for struts. G, Heavy stringer on flat. H, Diagonal strut. I, Chine, rock elm, 2 ins. by 2 ins. K, $\frac{3}{16}$ in. 3-ply. L, Deep spruce sill. M, $\frac{3}{16}$ in. 3-ply gusset at alternate floors. N, Floors $\frac{5}{8}$ in., spaced 10 ins. O, Three tubes, $1\frac{1}{2}$ in. 18 g. mild steel; M.R. = 30 cwt. = 6 cwt. on 20 ins.; total weight 96 lbs. P, Girder keelson cut asunder by two struts. Q, Bottom planking two inner diagonal skins $\frac{3}{32}$ in. mahogany; one outer skin $\frac{3}{16}$ in. mahogany. R, Spruce floors split easily. Weight of boat, 3,000 lbs. Total displacement of hull, 114,200 lbs. Weight of hull per lb. displacement, 0·026 lb. Surplus buoyancy, 444 per cent. Total flying weight, 21,000 lbs. Weight of hull, $14\frac{1}{2}$ per cent. of total flying weight. Objectionable features in construction: 1. Struts cut away part of stringers. 2. Centre struts cut girder keelson and render it useless in tension. 3. The steel tubes are of little use as keelsons and the fastenings are weak. 4. There is no continuity fore and aft except keel, sides and steel tubes. 5. There is no continuity athwartships to connect fins to hull except skins and timbers. This is a very weak point. 6. The top of fin is in compression, and should therefore be straight, not rounded. 7. There is no proper member to take the thrust of the heels of side struts which are not properly connected to boat sides to distribute the load. 8. The main floors split easily. N.P.L.: The floor broke up when evenly loaded with 796 lbs., supported at ends and centre as in boat.

Strength Test of Flexible Construction on A.D. Boat at the R.A.E., Farnborough

Fig. 17 shows the hull supported at the ends on chocks, free to move as requisite with bending of the hull which was loaded with shot-bags above the C.P. up to 2,000 lbs. The greatest deflection was slightly over $\frac{1}{4}$ in., and the breadth of the main hull was increased $\frac{1}{8}$ in. at the full

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS

FORTHCOMING EVENTS

1920.	
July 3	Air Tournament at London Aerodrome, Hendon, in aid of R.A.F. Memorial Fund.
July 9-20	Sixth International Aero. Exhibition at Olympia.
July 17-31	Aeronautical Meeting, Antwerp.
July 24	Aerial Derby, at London Aerodrome, Hendon.
Aug. 28-29	Jacques Schneider Cup, Venice.
Sept. 8, 9 and 10 ..	Fédération Aéronautique Internationale Conference, Geneva.
Sept. 27-Oct. 2 ..	Gordon-Bennett Aviation Cup, Paris.
Oct. 23	Gordon-Bennett Aeronautic Cup, Indianapolis.

FINANCE COMMITTEE

A meeting of the Finance Committee was held on Wednesday, May 19, 1920, when there were present :—Mr. J. H. Nicholson, in the Chair, Mr. Ernest C. Bucknall, Lieut.-Col. F. K. McClean, and the Secretary.

HOUSE COMMITTEE

A meeting of the House Committee was held on Tuesday, May 25, 1920, when there were present :—Mr. Ernest C. Bucknall, in the Chair, Mr. Herbert J. Corin, Lieut.-Col. F. K. McClean and the Secretary.

COMMITTEE MEETING

A meeting of The Committee was held on Wednesday, May 26, 1920, when there were present :—Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair, Mr. Ernest C. Bucknall, Mr. G. B. Cockburn, Squadron-Leader T. O'B. Hubbard, M.C., R.A.F., Col. F. Lindsay Lloyd, C.M.G., C.B.E., Lieut.-Col. F. K. McClean, Lieut.-Col. Alec Ogilvie, Lieut.-Col. Mervyn O'Gorman, C.B., Mr. F. Handley Page, Sir Mortimer Singer, K.B.E., J.P., and the Secretary.

Election of Members.—The following New Members were elected :—

Flight-Lieut. Valentine Henry Baker, R.A.F.
Frederick Sidney Cotton.
Edmond David Girardot.
Flight-Lieut. Richard Francis Osborne, R.A.F.
Harry Hollins Powell.
William Shackleton.

British Records.—The following British Records were passed :—

CLASS C. No. 4B.—**Greatest Speed over a Straight Line Course of One Kilometre**

(*Fédération Aéronautique Internationale*)

Type	Martinsyde "Semi-Quaver."
Constructor	Martinsyde Ltd., Woking.
Motor	300 h.p. Hispano Suiza.
Pilot	Mr. F. P. Raynham.
Place	Martlesham Heath, Suffolk.
Date	March 21, 1920.

Greatest Speed (*being the mean speed of four runs, in accordance with the Regulations of the Fédération Aéronautique Internationale* 1920) 259.75 kilometres per hour (= 161.434 miles per hour).

CLASS C. No. 5.—**Records for Useful Load Carried (1,500 Kilogs.), Duration and Height**

(*Fédération Aéronautique Internationale*)

Type	Handley Page W. 8.
Constructor	Handley Page, Ltd., Cricklewood, London, N.W.2.
Motors	Two Napier "Lion" 450 h.p. each.
Pilot	Capt. G. T. R. Hill.
Useful Load Carried ..	1,674 kilogs. (= 3,690 lbs.)
Place	Handley Page Aerodrome, Cricklewood, London, N.W.2.
Date	Tuesday, May 4, 1920, at 12.30 pm.
Duration	1 hour 20 mins.
Height	4,267 metres (= 13,999 ft.).

Aviators' Certificates.—The following Aviators' Certificates were granted :—

7871. Alfred James Gogarty.
7872. Arthur Dayer Makins.
7873. P. F. Hassett.
7874. Baden Lloyd Pelham.
7875. Charles James Blackburn.

Aeronauts' Certificates.—The following Aeronauts' Certificates were granted :—

274. Sebert Humphries.
275. Arthur Frederick Daubeny de Moleyns.

Finance Committee.—The report of the Meeting of the Finance Committee held on May 19, 1920, was received and adopted.

Racing Committee.—Mr. G. B. Cockburn reported the completion of arrangements for the holding of Club Aviation Meetings at the London Aerodrome, Hendon.

Brig.-Gen. Sir Capel Holden and Col. F. Lindsay Lloyd were appointed to the Racing Committee.

AERIAL DERBY AROUND THE WORLD

Maj. Charles J. Glidden of the Aero Club of America, who has been travelling round the world in connection with the organisation of the Aerial Derby Around the World, was the guest of the Committee of the Club at dinner, on Wednesday, May 26, 1920, when he explained fully the details of the proposed Competition. After having heard the views of the Committee of the Club, Maj. Glidden was of opinion that the rules would require revision before submitting them to the Fédération Aéronautique Internationale, at its Conference at Geneva, in September next.

RACING COMMITTEE

A Meeting of the Racing Committee was held on Monday, May 31, 1920, when there were present :—Mr. G. B. Cockburn, in the Chair, Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., Col. F. Lindsay Lloyd, C.M.G., C.B.E., and the Secretary.

Aerial Derby.—The preliminary regulations for the Aerial Derby to be held at the London Aerodrome, Hendon, on Saturday, July 24, 1920, were approved.

ROYAL AERO CLUB AVIATION MEETINGS

The Royal Aero Club has made arrangements with the Grahame-White Co., Ltd., for the use of the London Aerodrome, Hendon, for Aviation Meetings during the current year. Members will be admitted free to these Meetings on production of their Club Membership Card. The first Meeting, the Aerial Derby, will be held on Saturday, July 24, 1920.

SIXTH INTERNATIONAL AERO EXHIBITION, OLYMPIA, JULY 9—20, 1920.

Inventions and Model Section

The Royal Aero Club has undertaken the organisation of the Inventions and Model Section of the Sixth International Aero Exhibition which will be held at Olympia, July 9–20, 1920, and the Club will be glad to receive entries for this Section.

Anyone with inventions or models appertaining to aircraft is requested to communicate with the Secretary, Royal Aero Club, 3, Clifford Street, London, W.1.

THE FLYING SERVICES FUND

(*Registered under the War Charities Act*, 1916.)

Administered by the Royal Aero Club.

For the benefit of *Officers, Non-Commissioned Officers and Men* of the ROYAL AIR FORCE who are incapacitated while on duty, and for the widows and dependants of those who are killed or die from injuries or illness contracted while on duty.

Honorary Treasurer :
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Secretary :
H. E. PERRIN.

Bankers :
Messrs. BARCLAYS BANK, LTD., 4, Pall Mall East, London, S.W. 1.

Subscriptions

	£	s.	d.
Total Subscriptions received to May 17, 1920..	17,133	5	2
Major P. Litherland Teed (5th contribution) ..	4	4	0
Total, May 31, 1920	17,137	9	2

ROYAL AERO CLUB
FIRST RACE MEETING, 1920
AERIAL DERBY

(*Under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aéronautique Internationale.*)

AT THE

LONDON AERODROME, HENDON, N.W.
(By arrangement with the Grahame-White Co., Ltd.)

SATURDAY, JULY 24, 1920, at 3.30 p.m.

REGULATIONS

QUALIFICATIONS OF COMPETITORS.—The Competition is open to persons of any nationality holding a licence issued by any Aero Club affiliated with the Fédération Aéronautique Internationale.

ORGANISATION.—The Competition shall be conducted by the Royal Aero Club under the Competition Rules of the Royal Aero Club and the Regulations of the Fédération Aéronautique Internationale.

ENTRIES.—The entry fee is £10. This fee together with the entry form must be received by the Royal Aero Club, 3, Clifford Street, London, W. 1, not later than 12 noon on Wednesday, July 14, 1920.

COURSE.—The Course is approximately 200 miles, and will consist of a double circuit of London, starting from the London Aerodrome, Hendon, with the following turning points :—

Brooklands Aerodrome, Weybridge.
Epsom.
West Thurrock.
Epping.
Hertford.

GENERAL

1. A competitor, by entering, thereby agrees that he is bound by the Regulations herein contained or to be hereafter issued in connection with this competition.

2. The interpretation of these regulations or of any to be hereafter issued shall rest entirely with the Royal Aero Club.

3. The competitor shall be solely responsible to the officials for the due observance of these Regulations, and shall be the person with whom the officials will deal in respect thereof, or of any other question arising out of this competition.

4. A competitor, by entering, waives any right of action against the Royal Aero Club for any damages sustained by him in consequence of any act or omission on the part of the officials of the Royal Aero Club or their representatives or servants or any fellow competitor.

5. The aircraft shall at all times be at the risk in all respects of the competitor, who shall be deemed by entry to agree to waive all claim for injury either to himself, or his passenger, or his aircraft, or his employees or workmen, and to assume all liability for damage to third parties or their property, and to indemnify the Royal Aero Club in respect thereof.

6. The Committee of the Royal Aero Club reserves to itself the right to add to, amend, or omit any of these rules should it think fit.

PRIZES

A complete list of the prizes will be published next week. The cash prizes will be as follows :—

Fastest Time		**£500**
Handicap	**1st Prize**	**£250**
Handicap	**2nd Prize**	**£100**
Handicap	**3rd Prize**	**£50**

Offices : THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

THE ANNUAL RECEPTION AT THE N.P.L.

IN accordance with the time-honoured custom of opening the N.P.L. to visitors once every year, a reception was held by Sir Joseph Petavel and members of his staff at Bushy House on Friday of last week. As in previous years the Engineering Department and Aerodynamics Department were open from 4 to 7 for exhibits and demonstrations. During the afternoon tea was served to a distinguished gathering of visitors representing science, various branches of engineering, the Ministry of Transport and the Air Ministry.

Of greatest interest to those connected with aviation was naturally the Aerodynamics Department, in which a series of interesting exhibits were examined, and demonstrations given by Messrs. Relf, Fage, Pannell, Bryant, Irving, Lavender, Frazer, Simmons, Cowley, Jones, Levy, Ower, Batson, Bateman, Howard, and Williams. In the 4-ft. channel No. 1 was demonstrated an airscrew balance used for measuring the thrust and torque of an airscrew, and also the lateral force on the airscrew when yawed so as to be at an angle to the wind, as occurs in an actual machine during, for instance, a side slip. In another of the old 4-ft. wind channels, No. 2, a demonstration was given of the auto-rotation of a stalled aeroplane. The model is so mounted as to be set at a large angle of incidence, and is constrained to rotate about a horizontal axis through the centre of gravity. As soon as the air current was started the model commenced to rotate, illustrating very clearly the main characteristics of a spinning nose dive.

The 7-ft. channel No. 1 was being used for measuring the performance of an airscrew, a specially designed apparatus being employed for this purpose. The model airscrew was driven by an electric motor totally enclosed in a model fuselage, this arrangement representing the case of an actual airscrew installed in an aeroplane or airship and enables the effect to be ascertained of the presence of the *fuselage* on the performance of the propeller.

In the 7-ft. channel No. 2 was shown a model aeroplane wing provided with *ailerons* hinged so as to be capable of any setting in relation to the rest of the wing. The model is so mounted that the rolling moment due to any *aileron* setting, and also the hinge moment of the *aileron*, can be measured by light balances in the roof of the wind tunnel. Finally visitors were shown, in 7-ft. channel No. 3, how measurements are obtained of the lift and drag of aeroplane models. The model was supported mainly by two wires from the wings. These wires passed through the roof of the tunnel to a balance above. The tail of the model was held by a pin joint at the lower end of a lever which formed part of a second roof balance. By means of these two balances it is possible to find the lift, drag, and pitching moment about any desired axis.

In the Engineering Department many of the exhibits and demonstrations were naturally not directly connected with the science of aircraft construction, although indirectly there are few fields of endeavour which do not bear upon this youngest of sciences. Of immediate interest were, however, the internal combustion engine section, the apparatus for measuring skin friction, sound location apparatus, and apparatus for timing reflex action. Of special interest in the internal combustion engine section were the apparatus for investigating the effect of pressure and temperature in the detonation of internal combustion engines, and the testing apparatus for fireproofness of magnetos.

The subject of fluid motion is so closely linked up with aerodynamical problems that it was with the greatest interest one examined the apparatus for measuring the skin friction of air passing over smooth surfaces from observation of the velocity distribution of the surface. Another arrangement allows of measuring the skin friction of air passing over thin flat plates from observations of the momentum of the air. Finally the sound location apparatus interested many, from the possibility of utilisation in connection with commercial air routes.

Useful Load Record

A NEW record is now to the credit of the Handley Page W.8, with two 450 Napier-Lion engines. Piloted by Capt. G. T. R. Hill, this machine on May 4 carried 1,674 kilogs. (3,690 lbs.) of "useful load" to a height of 4,267 metres (13,999 ft.) in 1 hour 20 mins. Photographs of the machine and its load appeared last week.

And a "Semi-Quaver" Speed Record

MR. F. P. RAYNHAM, piloting a Martinsyde "Semi-Quaver" machine, with 300 h.p. Hispano-Suiza engine, on March 21 put up a new British speed record over a kilometre. His average speed both ways worked out at 259.75 kilos per hour (161.434 m.p.h.). The *Certificates of Performance* of both these were issued a fortnight ago.

INTERNATIONAL LAW ASSOCIATION AND AIR RULES

THE final meetings of the International Law Association's Conference at Portsmouth were held in the Town Hall on May 31.

Lord Reading was unanimously elected President of the Association for the ensuing year, with Dr. Jitta and Dr. B. C. J. Loder, Judge of the Supreme Court of the Netherlands, as Vice-Presidents. The invitation of Holland was accepted to hold next year's conference at The Hague, and Dr. Jitta agreed to be president of that conference.

The future of aviation in time of peace—one of the most interesting and progressive subjects which was discussed at the Conference—was left to this final session.

Sir Erle Richards, K.C., Chichele Professor of International Law at Oxford, took the Chair for the discussion of aviation in peace time. He said that unless restrictions were placed on aircraft in future, we should in war-time have fleets of aircraft devastating populations and destroying property wholesale. The long-disputed question of air sovereignty had now been settled in the sense recommended by the association at its Madrid conference in 1913 by the Convention for the regulation of aerial navigation, signed on October 13 last, to which all the Allied Powers and some others were parties, and to which other nations could subscribe if they liked. The Convention laid it down that the high contracting Powers recognised that every Power had complete and exclusive sovereignty over the air-space above its territories.

A paper by Professor H. D. Hazeltine was summarised by Sir Erle Richards.

In it, Professor Hazeltine referred to the draft convention of the Paris Conference in 1910, which was never put into operation owing to a vital difference on the question whether the principle of aerial freedom or that of aerial sovereignty should be the basis of the Convention, and therefore of international law. As a result of the war-time evolution there had been, since the conclusion of the Armistice, a rapid development both of international aircraft services for the carriage of mails, goods and passengers, and of services for international communication by wireless telegraphy and telephony. Especially important was the recent demonstration of the practical value of wireless telephonic communication between aircraft in flight and stations on the land and in ships at sea. The world stood on the threshold of vast new developments in the extension of international aerial navigation and communication.

The Air Navigation Convention, which was signed by representatives of many countries on October 13, 1919, was now the principal legal basis of international air navigation in time of peace. Article I of that Convention provided that the contracting States recognised that every State had complete and exclusive sovereignty in the air space above its territory and territorial waters. The International Law Association adopted the doctrine of air sovereignty at its meeting in Madrid in 1913. It was the only body of international jurists which held that view in pre-War days, and its services to a sound doctrine should be recognised in the hour of the triumph of air sovereignty.

Professor Hazeltine then referred to that part of the Air Navigation Convention which provides that "each contracting State undertakes in time of peace to accord freedom of innocent passage above its territory and territorial waters . . . to the aircraft of the contracting States," provided that the conditions of the Convention were observed. He pointed out, however, that this doctrine of innocent passage did not mean that those who accepted it also approved of the doctrine of the "freedom of the air." In conclusion, he said that it was clear that the basis of the international law of aviation in time of peace had been laid. Three tasks of fundamental importance now awaited the study of international lawyers :—The detailed examination of the International Air Navigation Convention of 1919, with a view to the proposal of any changes which might be necessitated by the progress of aviation ; and the further study of the International Radiotelegraphic Conventions of 1906 and 1912. There was a close relationship between wireless communication and aviation and between the International Conventions which regulated them ; and that connection was destined, with the growth of scientific invention and practical experience, to become more intimate as time passed. In general, it might be said that international air law in time of peace comprised two main divisions—the law of wireless communication and the law of flight. Any comprehensive study of international air law in time of peace must embrace both of those main sub-divisions of the subject.

A second task of equal importance was the study of the municipal air regulations of all the world's States and of their relation to international rules. That study should embrace not only the municipal law of aviation, but also the municipal law of wireless communication. Municipal air law, in both of its main branches, was important in itself ; and it was also important in its relation to international air law. The two bodies of law—international and municipal—were indeed so intimately bound up one with the other that the international lawyer must bring them both within the scope of his studies.

A third task which now awaited the international air lawyer was the careful study of international air law in time of war. The rules of pre-War law must now be studied in the light of the aerial practices of States during the War of 1914-1918. Here again the subject demanded a study of the rules which applied to both wireless and aircraft, and of the close relationship between the two sets of rules. Air warfare by the agencies of wireless telegraphy and telephony and of aircraft was destined to play a *rôle* of commanding and ever-increasing importance in any future wars. International lawyers ought now to frame a code of rules which would regulate the conduct of air warfare and, if possible, lessen its harmful effect on combatants and non-combatants alike.

These were certain of the main tasks which now devolved on international air lawyers. In the solution of the problems involved in the present state of international air law, for the time of peace and the time of war alike, the International Law Association should take a leading part. What was demanded was not merely interest in this new branch of international jurisprudence. Interest had been awakened, and it should now lead to careful and scientific study of the nature of the problems and of the juridical principles which ought to be applied in their solution. Only by that method would the association exert an influence on the League of Nations and the international conferences which would be charged with the duty of revising existing Conventions and of framing new ones more in harmony with the needs of international society.

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ROYAL AERONAUTICAL SOCIETY NOTICES

Wilbur Wright Lecture.—Members desiring to attend themselves, and bring friends to the Wilbur Wright Lecture, should make application to the Secretary for reserved seats which will be allotted in the order of application. The lecture will commence at 8.30 p.m. at the Central Hall, Westminster, on Tuesday, June 22, the title of Comdr. Hunsaker's paper being "Naval Architecture in Aeronautics." H.R.H. Prince Albert will take the Chair.

Technical Terms Committee.—The next meeting of the Technical Terms Committee, which is No. 1 Sub-Committee (Nomenclature) of the Aircraft Section of the British Engineering Standards Association, will be held in the Society's offices at 5 p.m. on Friday, June 4. Representatives of the Department of Training and Organisation, and of the Instrument Department of the Directorate of Research of the Air Ministry, have lately been added to this Committee.

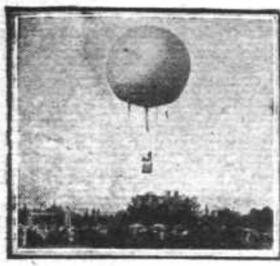
Arrangements for June.—June 4, Technical Terms Committee Meeting ; June 15, 3.30 p.m., Candidates Qualifications Committee Meeting ; 4 p.m., Lectures and Publications Committee Meeting ; 5 p.m., Council Meeting ; June 22, Wilbur Wright Lecture.

W. LOCKWOOD MARSH,
Secretary.

7, Albemarle Street, W. 1.

Mesopotamia Mishap

ALTHOUGH from the military point of view affairs in Mesopotamia are somewhat less disturbed, the elements seem to be pretty turbulent as well as in Europe. It is reported that the aeroplanes stationed at Anah were all destroyed by a hurricane on May 18.



AIRSHIPS

RIGID AIRSHIPS AND THEIR DEVELOPMENT

BY J. E. M. PRITCHARD. M.A., F.G.S.

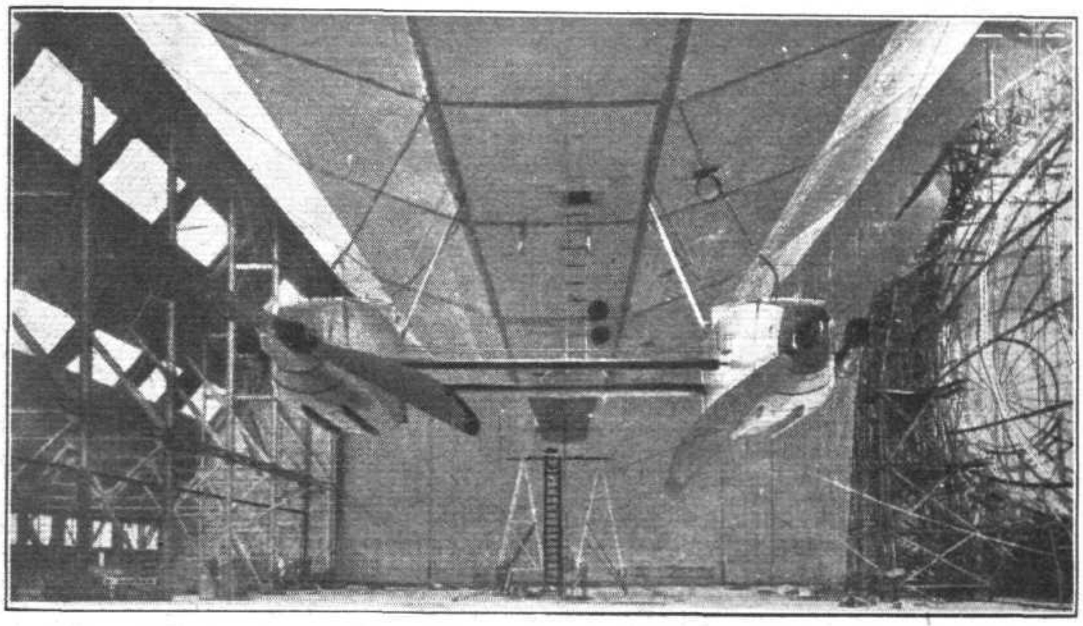
(*Concluded from page* 581.)

Car Suspensions

Two main types of car suspensions are also in force :—

1. The Zeppelin type.
2. The British type.

The Zeppelin Company attach their cars by means of a combination of struts and wires. The struts take the compressional forces due to the thrust of the propeller, and maintain the car at the correct distance from the centre line of the ship. The wires bear all tensional strains, and, broadly speaking, take the weight of the car.



R 31 : Wing cars, showing British method of car-suspension

The British arrangement allows for a minimum of struts, which are only fitted transversely to maintain the car at a given distance from the centre line, the thrust of the propeller being taken by a wire which is led out through the centre of the propeller aft.

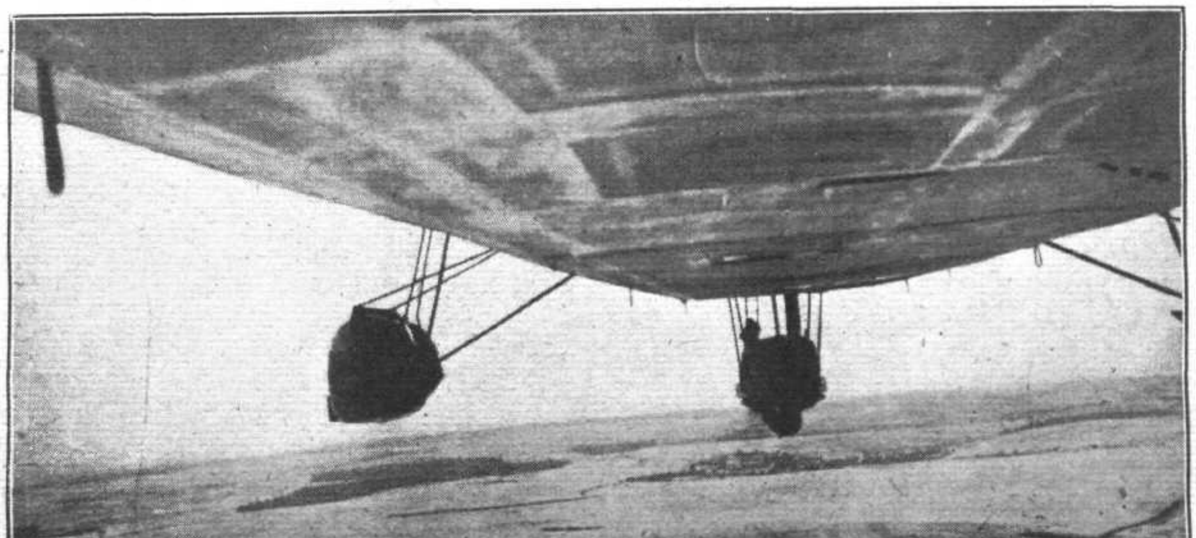
Although the British system is the less complicated, and provides a more elastic form of suspension, which transmits less vibration to the hull of the ship, much instructed opinion appears to favour the Zeppelin arrangement on account of its greater safety and reliability.

The British cars, on account of the absence of vertical struts, are called "floating" cars. In the case of a heavy landing floating cars are an advantage, because, except in extreme cases, the cars alone are damaged, and the vertical struts are not driven upward into the hull of the ship, breaking the main framework at the upper point of attachment.

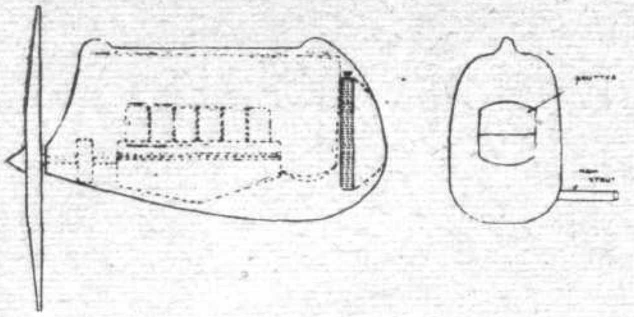
The Zeppelin arrangement attempts to get over this by carefully adjusting the strength of the struts so that, when a heavy landing is made, the struts break before the hull structure of the ship is damaged.

Looking into the future, however, it does not seem necessary to allow for bad landings. Few have been made recently by British pilots, and the few German pilots of experience appear to make consistently good landings with no fear of damage.

Bodensee: View of power units showing German system of car-suspension



A certain number of heavy landings were made throughout the war in Germany, but if the matter is looked into these heavy landings can be traced to war emergencies or to the inexperienced captains of ships. In Germany, partly owing to its proximity to England, rigids were not used in a legitimate way, and their bombing raids produced such a high percentage of mortality in their flying crews that much difficulty was experienced in maintaining highly trained and experienced flying personnel.



Small German direct-driven power car

The question of car suspensions in general is one of considerable difficulty and complexity. The arrangement has naturally to be simple and of low head resistance. It has to provide for the ship taking up a considerable angle of pitch (some 35 to 45 degrees up or down). With the present large geared-down pusher propeller, it is, besides, a matter of some difficulty to arrange a simple and reliable method of taking the thrust. In the most recent power units this has to some extent been overcome by the increase in speed of rigids and great reduction in size of the power egg. This allows much smaller direct-drive propellers to be fitted without undue blanketing. If the car is designed to have considerable overall height aft, it is possible to take the thrust by means of a wire attached to the after end of the girder which runs along the top of the car. This wire, which just clears the propeller, is led aft and attached to the hull.

At first sight this type of car would appear to be of somewhat high head resistance, because, although well streamlined in plan, it is badly streamlined in elevation. It appears, however, that when fitting a small appendage to a large streamline body, the inner side of the appendage should not be streamlined, but should lie parallel to the large streamlined body to which it is attached. This, it is seen, is complied with in the car shown in diagram, which is streamlined in plan and underneath, but the top is roughly parallel to the underside of the ship, and consequently does not cause as much disturbance in passing through the air as would be the case if it had been perfectly streamlined.

Power Units

Naturally, the three main points to be achieved in designing the power units for a rigid airship are :—

(1) Reliability.
(2) Low petrol consumption per unit of thrust-horse-power.
(3) Low head resistance.

Assuming that heavy duty reliable engines are available of various horse-powers, several points arise. In the first place, the greater the number of engines the greater the reliability, and, generally speaking, the greater the efficiency of the propellers, owing to the smaller horse-power of each unit. At the same time, the head resistance and weight of the installation will be materially increased, also. Each additional power unit requires at least two engineers, one on duty and one off, complete with their food, parachutes, sleeping accommodation, etc. It is seen, therefore, that there are important reasons for not fitting more power units than are absolutely necessary from the point of view of :—

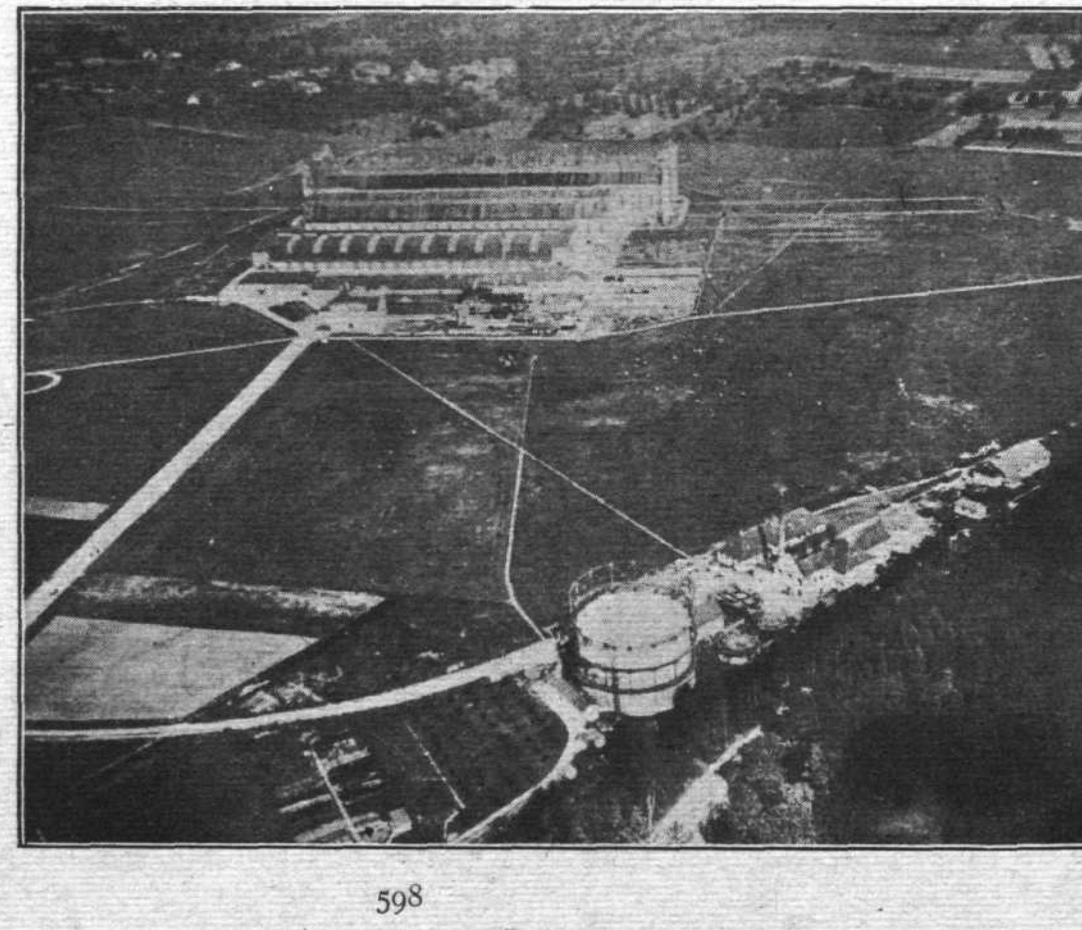
(*a*) Not concentrating too much weight at one point.
(*b*) Not increasing the horse-power of each unit to such an extent that the propeller becomes too inefficient.
(*c*) Maintaining the necessary degree of reliability, having regard to the probable reliability of each power unit as a whole.

Where the horse-power required is not too great, a vertical engine is most suitable and easy to instal. Two clutches are at present required, one a dog clutch, the other a multiple disc. A reverse gear should be fitted to at least one-half of the power units for assisting in landing and mooring.

Generally speaking, great efficiency is obtained with a large geared-down propeller. On the other hand, no very satisfactory form of gearing is available. Epicyclic gearing, although occupying little room and weighing much less than the ordinary spur gear, has not so far proved to be sufficiently reliable, and the ordinary tooth gearing takes up a good deal of room and is very heavy, the non-reversing gear and transmission in R 33 weighing as much as 54 per cent. of the weight of the engine, and for the reversing units 66 per cent.

In practice, with a fast rigid of some 2,000,000 cubic ft. capacity, it is probably more efficient to fit very small streamline power units, each unit developing from 250 to 300 h.p. and actuating a direct-drive two-bladed propeller, except in those cars where it is necessary to fit a reverse. A brake should be fitted to the transmission shaft between the propeller and the clutch, so that the propeller can be allowed to

Friedrichshafen : General view from an airship



rotate when the engine is not running, thus minimising head resistance, but so fitted that the propeller can at will be brought to rest for landing purposes, etc., by applying the brake.

Pusher power units are more suitable than tractor units, and are always fitted. They simplify the slinging, and are generally more convenient and efficient.

The best position in which to fit the radiator is doubtful, and several views are held. The general requirements are as follows :—

1. The radiator must be so fitted that it can at will be thoroughly protected from the outer air during cold weather flights when the engine is not required to be run or when under repair, to prevent rapid freezing of the radiator water.

2. To give maximum cooling efficiency with minimum head resistance.

3. To be fitted in such a position in those units provided with a reversing propeller that, when running in the reverse direction, the radiator still provides efficient cooling.

4. Ease of inspection during flight.

5. Ease of refilling with water during flight.

6. Means of varying the area of cooling surface, or conversely, the draught, so that an approximately constant temperature can be maintained under varying conditions of air speed and air temperature.

Engines.

The tendency during the War has been to produce a number of highly efficient aircraft engines from the point of view of weight per brake horse-power. In designing these engines, however, reliability over long periods and low fuel consumption have been in nearly all cases a secondary consideration.

The main requirements for a rigid airship engine are :—

1. Reliability.

2. Fuel economy.

3. Ability to develop continuously a high percentage of its maximum brake horse-power, *i.e.*, to run continuously at about nine-tenths full power.

4. Low maximum revolutions, in the order of from 800 to 1,400 r.p.m.

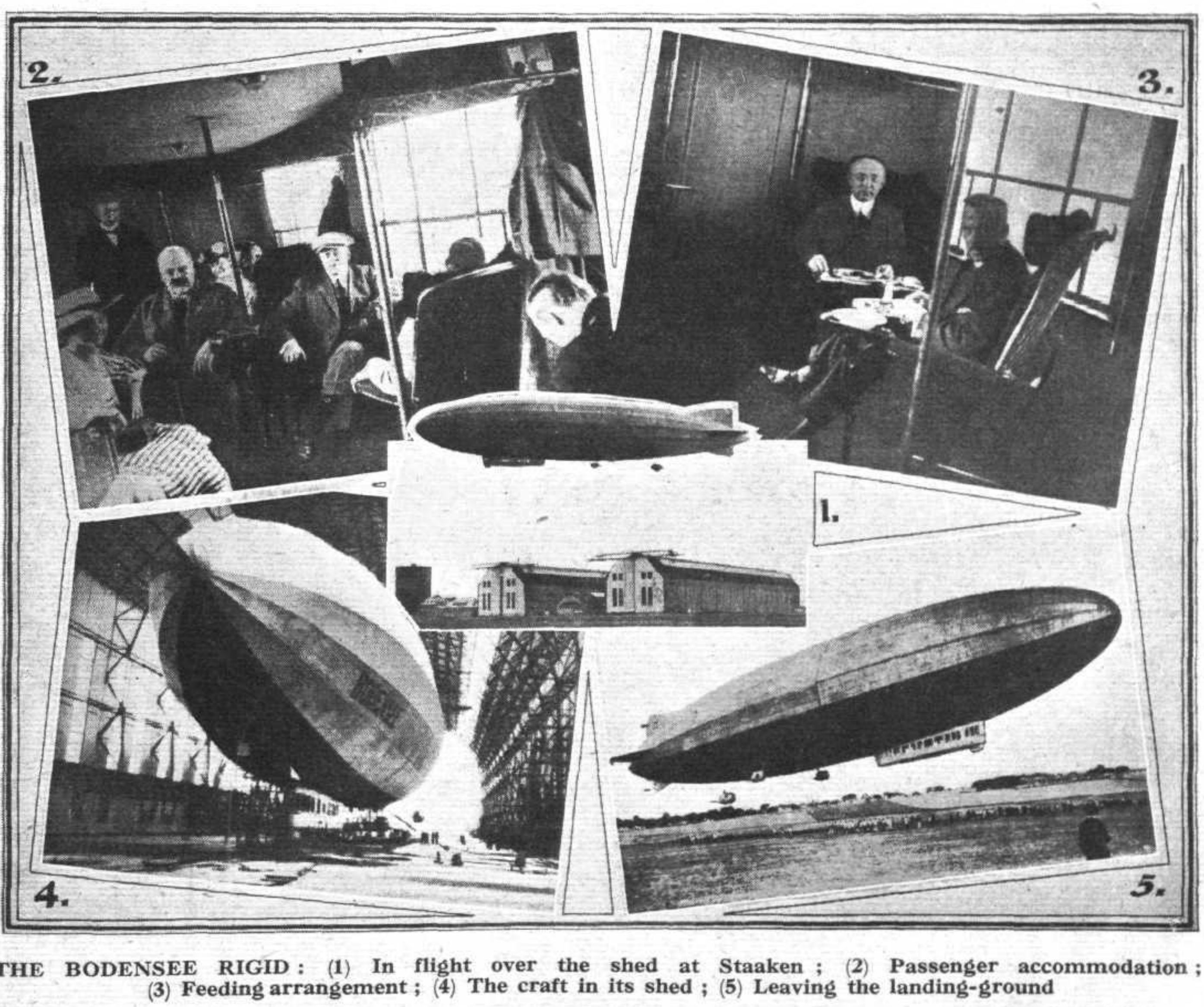
5. Simplicity and ease of carrying out overhauls in the air.

6. Ability to run for long periods without overhaul.

An airship engine possessing such qualities will effect a considerable gain in efficiency over present aircraft engines for long flights, even if it is necessary to allow as much weight as 6 lbs. per brake horse-power. It would appear, in this connection, that the engine requirements of large seaplanes and large bombing aeroplanes are very similar to the above ; and it is, therefore, essential, if this country is to regain supremacy in the air, that the aircraft designing resources of this country should be directed towards the production of heavy duty aircraft engines as well as the present high performance type. Low fuel consumption is of extraordinary importance in rigid airships, where long flights of 100 hours and upwards are possible. A saving in fuel consumption of ·05 lb. per brake horse-power means that for every 100 hours of flying no loss in endurance would result if the weight of the engine were increased by 5 lbs. per brake horse-power. A great fault in many aircraft engines fitted to airships during the War is that although reasonably economical in fuel consumption at full power, their economy falls off rapidly when run at the necessary reduction in power to produce reasonable reliability.

A vertical engine is in general more suitable than the "V" type of engine, and should be adopted in all cases where the horse-power required per cylinder is not too great, as it allows for the construction of a narrower power unit of appreciably lower head resistance. A vertical engine is besides, more accessible and easier to repair during flight than the "V" engine.

The most suitable horse-power for airship engines is a matter for careful consideration. As previously indicated, this question is rather a matter for compromise, having regard to the amount of weight desirable to concentrate at a single point, and the number of units required for the ship



THE BODENSEE RIGID : (1) In flight over the shed at Staaken ; (2) Passenger accommodation ; (3) Feeding arrangement ; (4) The craft in its shed ; (5) Leaving the landing-ground

to obtain the necessary degree of reliability. As a modifying factor, however, it should be noted that the efficiency of a direct drive propeller at present falls off greatly in engines of over 400 h.p., and thus the petrol consumption per unit thrust tends to increase with more powerful engines. On the other hand, with more powerful engines it is possible to construct power units of lower head resistance per break horse-power, and the weight per brake horse-power of the whole unit also tends to decrease with increase in power.

The question of fitting steam engines to rigid airships in place of the present internal combustion engines, is a matter of some interest. The steam engine is extraordinarily attractive but for one drawback, namely, its heavy fuel and water consumption per brake horse-power hour. Till this can be got over the steam engine is completely debarred. The actual weight of the installation, however, does not appear excessive. The petrol engine suffers greatly from loss of horse-power with height, as unless fitted with forced induction the horse-power tends to decrease as the density of the air. In the case of the steam engine no such loss of horse-power with height is experienced, and as an airship requires to fly at various heights owing to meteorological conditions, etc., this quality would be of considerable advantage. The very great reliability, ease of reversing, flexibility, and silence need hardly be emphasised.

The question of the most suitable fuel is one of very great importance. Owing to the method of storage, the fuel must not be viscous and likely to clog the pipes bringing it from the internal keel to the power units. A low freezing point is also essential for flying at great heights or in winter weather, and this rules out such spirits as benzole.

To the uninstructed mind, danger of fire in airships is generally thought to be due to the presence of hydrogen, and for this reason one frequently sees in the Press articles dealing with the desirability of adopting helium at all costs. A far more important question appears, however, to be completely ignored, namely, the danger of fire due to fuel ignition. If the fate of an airship carrying from 20 to 50 tons of briskly burning petrol, whether inflated with hydrogen or helium, is contemplated, it will be readily realised that the advantages in the use of helium are not so obvious as would at first sight appear. If, further, the number of aeroplanes shot down in flames during the War, or which caught fire by themselves due to some failure in the petrol system or engine, is considered, it will be seen what an extraordinarily dangerous fuel petrol is.

Since the outbreak of war, British airships have patrolled over 2,000,000 miles. During this period of over five years there have been in all only eight cases of a British airship being destroyed by fire, five of these during flight and three on the ground. Of these eight cases, six can be definitely traced in the first instance either to actual petrol fire or to some cause originating in the engine. Of the remaining two cases, one airship was shot down in flames by a hostile seaplane, the inference being that the hydrogen was ignited by incendiary bullets; in the second, an abnormal, case an airship broke loose on the landing ground, and finally drifted on to some telegraph wires which apparently ignited the hydrogen. It will, therefore, be seen that in the great majority of cases the fires are attributable to other causes then hydrogen.

The heaviness of petrol vapour opposed to hydrogen is an additional cause of danger, as it tends to hang about the bottoms of the enclosed power cars and in the keel where the petrol is stored, unless very special precautions are taken, whereas hydrogen, owing to its lightness, tends to rise rapidly. The comparative immunity of airships from fire compared to H.A. craft, excluding enemy action, is probably attributable to the fact that saving in weight at the expense of reliability is not considered of such prime importance in the machinery installation of airships, and more rugged fittings have been used and more extensive safety precautions employed. The greater accessibility to the actual engine in airships also tends to minimise this risk. Nevertheless, it is clearly most necessary that every effort should be made to abandon petrol as a fuel for airship engines, and substitute a less volatile fuel such as paraffin.

Conclusion

I had hoped, in this Paper, after dealing with the various parts of a rigid, to discuss problems such as mooring, water recovery, and passenger accommodation, which all have an important bearing on structure and performance. This has proved to be impossible in the time allowed.

In conclusion, let me give some of the salient achievements of British airships. First, they have collectively patrolled and convoyed for over 2,000,000 miles during the War. Secondly, during the 10 months of 1918 prior to the Armistice the proportion of days upon which airships carried out their flights was 97 per cent. Since then the problem of mooring rigid airships to a mast has been solved, and it is now as easy for a rigid airship to fly to, fly away from, and ride to a mooring mast as it is for a surface craft to moor to a buoy. The record of coastal airship No. 9 emphasises the reliability of the individual airship. Her life was two years 75 days, her time in the air 2,500 hours, giving a flying average of three hours six minutes per day for the whole life of the ship.

Thus the actual achievements of British airships, during the last five years, both their reliable, useful, and regular patrol work, and their great range as illustrated in the Baltic and Transatlantic flights of R 34, showing more strongly than any words the very great future which lies in front of airships, especially when the improvement in performance which is automatically achieved merely by increase in size is realised. I hope, however, that this Paper has shown that the actual details of airship construction are still in their infancy, and that equally important improvement in performance, due to refinements in detail, can be predicted in the near future, if energetic airship research and experimental work be carried out.

Airship development is now being rapidly pushed forward in America, France, Italy and Germany. To this country airships are of even more importance, owing to the scattered nature of the British Empire and the undisputed supremacy of the airship for rapid long-distance transport. Great strides have been made during the War, even though Great Britain came late into the airship field; but she has now, by several years of unremitting effort, gained there a position second only to that of Germany.

CORRESPONDENCE

[*The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.*]

SIDE-SLIP LANDING

[2023] Having been away for some time I had not noticed before the other day the reply of E. J. D. to my article on Airbrakes and the Sideslip Landing.

His was a very depressing letter, in that, with all his expenditure of ink, he did not come within several miles of the subject of the article. I read his letter in several different positions before I got the least idea of what he was driving at, and after all, I could only conclude that he regarded my article in this light: If machines get much heavier they will have to land faster, and therefore they will require an airbrake to pull them up.

He appears to have misunderstood the diagram, I regret to notice, for he says he would not come down in steps, as I indicated, but would swing the nose of his machine, and increase or decrease his slip as necessary. And it probably has not occurred to him that if he increased or decreased his slip he would come down in steps, which was precisely what I was timidly trying to indicate.

The best answer to his enormous letter will be a summary of what I was supposed to be writing about.

Landing speeds are certainly going to get higher and higher. Soon probably a commercial landing speed will be 100 m.p.h. Therefore, in order to make the best possible use of available landing space, it will be necessary to touch as near as possible to the edge of that space. For that purpose the gliding angle will have to be regulated. The principal function of an airbrake is to regulate the gliding angle for a given speed. (No, E. J. D. it is *not* to regulate the speed.) The greater the resistance the steeper the gliding angle. As mechanical airbrakes are, to my mind, impracticable, hence the sideslip.—Q.E.D.

The matter of pulling up after landing is another problem altogether, and one to which I did not refer in my article. It is a designer's affair rather than a pilot's.

F. T. COURTNEY

South Kensington, May 11

AIRISMS FROM THE FOUR WINDS

WHAT a pity it is M. Fronval did not take up a gallon or so more petrol the other day when he put up 962 loops in 232 mins. He probably "went" for the round thousand, so we must expect presently to hear of another bout in the same direction. But wherefore this thusness? Whatever tribute it may be to his endurance, surely it is not contemplated crossing the Atlantic that way and this is just by way of a practice stunt.

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AIRCRAFT take quite a part in the greetings to the Prince of Wales at points of his Australian tour. In Melbourne a feature was again made of aeroplanes in conjunction with ships of the Australian Navy—and incidentally a "flight" of 3,000 pigeons. The Prince before arriving at Port Melbourne on May 26, where he made his first landing on Australian soil, had, by reason of fog, to transfer from the *Renown* to the Australian destroyer *Anzac*. With an escort overhead of a dozen aeroplanes and the entire Australian Navy in line before her, the *Anzac* then made for the port, where the Prince was welcomed by Rear-Admiral Grant.

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ACCORDING to the report of the Warwork of the College of Technology, Manchester, the departments of applied chemistry and textiles were responsible for the special dope with which the airships R 33 and R 34 were treated before starting on their long-distance flights.

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THOSE were critical days in the War during the first few months of 1918, and one side-light as to the possibility of the French having to retire from Paris—incidentally very characteristic of M. Clemenceau—is let in by M. Recouly in a work recently published by him under the title "La Bataille de Foch," describing the final campaign of the War from March.

M. Recouly describes how on March 23, M. Clemenceau returned from headquarters at Compiègne with a very bad impression of the situation at the front. He saw M. Poincaré, to whom he described the situation as extremely critical, and declared that unless the position rapidly improved, the Government might prepare to leave the capital. M. Poincaré declared that for the moment there must be no question of evacuation.

"Think it over," replied M. Clemenceau. "You will leave, if you like, the last but one. I will leave the capital last of all, if necessary by aeroplane."

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FORTUNATELY, the aeroplane incident did not have to materialise. The following day M. Clemenceau and M. Poincaré left together for Compiègne, where at Marshal Petain's headquarters they held a meeting at which Lord Milner was present. There it was decided to hold on the following day at Doullens the famous conference, the outcome of which was unity of command, which, as the world knows, led to the final victory.

BEWARE Trans-Atlantic stamps! A strong disclaimer comes from Mr. J. Alex. Robinson, Postmaster-General of Newfoundland from 1916 to 1919, in connection with a statement, *inter alia*, in an article in *The Times* of December 30 last headed "Stamps in 1919," referring to Newfoundland aerial stamps. The paragraph in question reads: "Stamps of several values bearing a distinguishing imprint were likewise prepared in connection with the Raynham-Martinsyde venture, but as this met with disaster at the outset were never used." Mr. Robinson, as Postmaster-General of Newfoundland at the time, and responsible for all stamp issues, states that the quoted statement is wholly incorrect. If any such stamps are in existence he says they were neither printed nor designed by the Postal Department or by any Department of the Newfoundland Government. Collectors are advised therefore than any "Raynham-Martinsyde" issues should be regarded as forgeries.

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ALTHOUGH announcements that the super-Zepp. L.71 was to arrive at Pulham on Monday last were premature, it is a fact that arrangements allow for the reception of this great airship within a very short period. There is no intention of making this craft, which will find its home at Howden, an "exhibit" for the general public. L.72, a sister ship, goes to France. She will be moored at Juan, pending the arrangements for a hangar at Crers-Pierrefou (Var.), which is proposed as her permanent base. In addition France is contemplating acquiring the "Nordstern," a rigid ship built at Friedrichshafen since the Armistice. America is also to acquire one of the German dirigibles, probably of smaller capacity than L.71 or L.72, and this vessel will probably be flown to the U.S. under the command of Capt. Maxfield and a picked crew of American airmen. Another airship of Zeppelin type is earmarked for Italy.

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ALREADY there is every promise, we learn, that the Air League's Mansion House Meeting on June 8 will be a successful function. The Lord Mayor has promised to take the chair, and a list of distinguished speakers is being arranged for. Members of the Baltic and Stock Exchange will be present in some force, and City Livery Companies are taking an interest in the meeting and circularising their members requesting them to be present. The commercial possibilities of aviation form a subject that should appeal with special force to City men, and it is for this reason that a strong effort is being made to interest the City and bring together a meeting of prominent commercial and business men.

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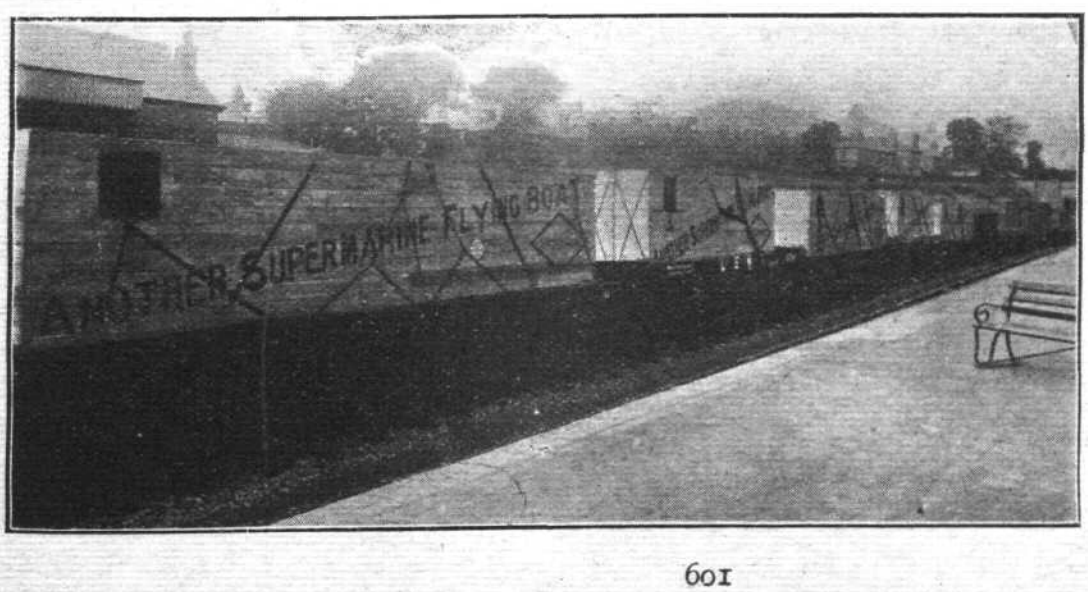
SATURDAY, July 24, should be a popular day for London, when the Aerial Derby, under the auspices of the Royal Aero Club, will, starting from Hendon Aerodrome, be resumed for the second time since the War. The course, as before, is on a circuit of London, and the public in their tens of thousands should be able to take part in one of the most sporty events of the year, and like its Epsom prototype, with a "free gate," except at the actual starting-point.



For the Royal Norwegian Navy: A consignment of three Supermarine four-seater Channel-type Flying Boats, together with spares, packed and on rail at Woolston Station, L. & S.W. Ry., for delivery to the Norwegian Government. These are the Flying Boats of the Supermarine Aviation Works, Ltd., to which we recently referred as having passed their final flight acceptance tests. Altogether a very suggestive move forward for a civil aviation firm, in spite of want of home official encouragement.

SOME POINTS OF IMPORTANCE IN THE WORK OF THE ADVISORY COMMITTEE FOR AERONAUTICS*

By Professor Sir RICHARD T. GLAZEBROOK.

THE first part of Sir Richard Glazebrook's paper was devoted to a brief history of the Advisory Committee for Aeronautics, which will already be familiar to readers of FLIGHT from the reports published by the Committee. In this the lecturer paid a warm tribute to the "band of able workers" who had carried out the experimental work. Then, dealing with the future, Sir Richard continued his paper as follows :—

And now let us turn to the future. After 126 meetings the Advisory Committee for Aeronautics has finished its work. Its place is taken by the new Committee for Aeronautical Research, performing functions different from those of the Advisory Committee, undertaking certain executive functions constituted with the following terms of reference :—

1. To advise on scientific and technical problems relating to the construction and navigation of aircraft.

2. To undertake or supervise such research or experimental work as is proposed to the Committee by the Air Ministry and to initiate any research work which the Committee consider to be advisable; to carry out such work itself, or to recommend by whom the work should be carried out.

3. To take over complete responsibility for the Air Inventions Committee and for the Accidents Committee.

4. To promote education in Aeronautics by co-operating with the Governors of the Imperial College.

5. To assist the Aeronautical industry of the country by scientific advice and research, and to co-operate with any Research Association that may be established.

6. To prepare for the approval of the Air Council a scheme of work and an estimate of expenditure for the year, and to administer the funds placed at its disposal by the Air Council.

7. To make reports from time to time to the Air Council.

The reference is sufficiently comprehensive, and gives ample opportunity for useful endeavour. While the Committee will work, I have no doubt, in cordial co-operation with the industry, and will realise that those who have to make their productions pay can teach them much, the industry, I trust, will appreciate the fact that for ultimate success the fullest scientific investigation of many difficult questions is necessary. It does not appear probable at present that any outstanding discovery is immediately in front of us; progress will rather be through minor improvements in many directions. The advent of the petrol motor and the reduction thereby caused in weight per horse-power of the engine made flying possible. A similar revolution is hardly likely to occur again just yet, but improvement in many directions is certainly to be hoped for. Let us consider the reference more fully, and first as to education. The education in question is mainly that of the engineer, the designer or constructor, or other scientific worker, the meteorologist, the navigator or electrician, rather than that of the pilot or the mechanic. The mechanic or artisan will be provided for naturally by special classes at technical schools in the neighbourhood of aircraft works; the pilot will learn and take his certificate at one of the flying schools; but the men who are to be designers or constructors need training in the theory of aerodynamics, the principles of design, the properties of the materials used, the theory and construction of engines; and for the meteorologists and navigators the laws of the weather and the theory and use of many complex instruments. Moreover, access is needed to a laboratory with wind channels and the other apparatus for model tests, and to an aerodrome with aircraft, machinery and staff for full-scale research. To such a specialised course an undergraduate training in mathematics, physical science or engineering forms a necessary introduction. For men who have passed through such training there should be provided—

a. Courses for those who have attained the highest standards of University training at the various technical schools.

b. Courses based on a sound general engineering education, but not involving too high a standard of mathematical knowledge, intended for men of special practical ability.

c. Opportunities for experimental work both in an aeronautical laboratory and a research aerodrome.

Now all this implies a heavy expenditure; moreover, the number of such students must at present, in view of the opportunities open to them on completion of their course, be small, it was necessary, therefore, to concentrate, and in view of the generous foundation by Sir Basil Zaharoff of his Zaharoff Professorship of Aviation—a Professorship of the University of London held at the Imperial College—it has been decided to make the Imperial College the Central School for Advanced Study in Aeronautics, and funds have been provided by the Government for this purpose.

There is much that can be done elsewhere. Aeronautics will, it is hoped, find some place in the curricula of many of our engineering schools; the principles concerned are the same whether applied to the structure of aircraft and the theory of the petrol engine, or to the building of a bridge or a locomotive, and there are many special problems which may well be studied wherever there is a man capable of the work and suitable apparatus for the investigator, but at present it does not seem possible to inaugurate complete courses of advanced construction at more than one centre, particularly when regard is had to the elaborate character and cost of the practical work. To secure this for the Central School arrangements have been made with the authorities at the Air Ministry and at Teddington by which students will have access to Farnborough or other Air Station or to the N.P.L. Details are hardly complete, but qualified students are to be admitted as student assistants, or in some such capacity, to these institutions, and will learn by taking their share with test work and the researches in progress. It is hoped in this manner to train a succession of designers and constructors fully qualified to carry on the brilliant work inaugurated during the last few years. And we trust we shall not be dependent solely on the Government institutions for opportunities of practical experience for our students, but look forward to firms and private works for assistance in this scheme of education. The Governors of the Imperial College have appointed a representative committee to advise them, and a scheme satisfactory to all concerned should be the result. In giving effect to such a scheme they will have the co-operation of the Research Committee, and for less advanced work we may look for help to many engineering schools. Aeronautical engineering in its principles does not differ from engineering generally. No complete special curriculum is required.

Mathematics and mechanics, some branches of physics and chemistry, machine design, strength of materials, and the theory of the heat engine are all common to the whole range of engineering training. The aeronautical engineer will pay attention to the thermodynamics and efficiency of the internal combustion engine rather than of the steam engine. A high-speed petrol motor will interest him more than a marine turbine. The properties of wood or of aluminium alloys will concern him more than those of mild steel. In dealing with the structures and with the propelling machinery of aircraft, the relation of strength to weight will be of prime importance, and no doubt at the Imperial College, as well as at other centres of Technical Education, opportunities will be given for such study to the undergraduate who proposes to join the aeronautical industry, while for his practical training he will go to an aircraft factory rather than to an engine works or a machine tool shop.

Let me conclude this part of the subject with a reference to one other duty which I trust will fall to the staff of the Central School. It should serve as a clearing house for the co-ordination and dissemination of aeronautical knowledge in all its branches. To quote from a recent report: "The functions of the teaching staff of the School may be stated under four distinct though closely related purposes :—

"*a.* To study, co-ordinate, summarise, apply and extend the knowledge derived from the experimental work carried out by the individual workers at various experimental stations in this country and abroad.

"*b.* To stimulate research by indicating what information is most urgently required and what line of attack is likely to prove most profitable.

"*c.* To guide and encourage research by constructive criticism based on the careful study of past and current work in this country and abroad."

After referring to the utility of a clearing house in any subject, the report continues :—

"In aeronautics the facts are the result of the work of the last five or ten years, and the frame work uniting them exists only in the minds of the few men who have been personally connected with the process of development."

Before the War the total available knowledge was small,

* Abstract from a paper read before the Royal Aeronautical Society on May 26.

and it was possible for the members of the Advisory Committee to keep all the facts in mind while devoting the majority of their time to other duties. They then provided the necessary co-ordinating factor. This is no longer possible, and the function could best be discharged by the staff of the school working under their director with a view to co-ordinating and making available all the knowledge in each branch of the work as existing at the moment.

But I am wandering too far from the work of the Advisory Committee and of its successor; let me return to the latter. We have discussed somewhat fully the manner in which it may promote education in aeronautics. Its main work, however, is to advise on scientific and technical problems, and to undertake or supervise research and experimental work in aeronautics. Let us consider its procedure and some of the more important problems calling for solution. As in the past, the work will be carried on mainly through the sub-committees, and the legacies left by the Advisory Committee are by no means inconsiderable. Recently some general questions relating to fluid motion have been under the consideration of the Advisory Committee. When fluid is flowing steadily along a tube of diameter d and at a uniform mean speed v thence up to a definite value of the quantity vd/ν where ν is the coefficient of kinematic viscosity, the fluid is at rest along the walls of the tube, its velocity increases as you move away from the walls according to a parabolic law and the friction between the fluid and the tube is proportional to v. As the quantity vd/ν increases beyond the critical value, this law breaks down, and ultimately the friction reaches a value approximately proportionate to v^2. It is of importance to know what exactly is the state of the motion at the surface. Is the fluid there still at rest, or does the laminas motion still persist close to the boundary?

Dr. Stanton has recently made some experiments on the flow close to the wall in tubes of 0.269, 0.714 and 12.7 cm. in diameter, and for values of vd/ν of 460 to 325,000. The measurements were made with a special Pitot tube, one side of which was the wall of the tube, while the other was a kind of small lip 0·05 mm. in thickness, which could be screwed outwards from the wall. By this means it was possible to make measurements of the friction on the walls and the velocity of flow for very small openings of the Pitot tube. In one series of measurements with the 12·7 cm. pipe the position of the centre of the Pitot tube ranged from 0·013 mm. to 0·178 mm. From the results it appears certain that there is always between the limits of vd/ν indicated a very thin layer along the walls of the tube which is in a state of laminas flow. The velocity is zero over the walls, and the friction is given by the limit of the quantity $\mu dv/dx$ when x is zero, x being measured at right angles to the surface. This result is one of the very greatest importance in the theory of fluid motion applied to aeronautics, establishing as it does the conditions which must be assumed to hold at the surface of aircraft. Along with this, perhaps, should be classed as fundamental for aerodynamical theory some recent work of Messrs. Cowley and Levy and some investigations on which it is understood that Professor Bairstow is engaged on the equations of motion of a viscous fluid.

The theory of the airscrew offers a wide field for investigation. Recent experiments of Mr. Fage have shown that the well-known Froude momentum theory when supplemented by the "inflow" effect gives a very good general account of the behaviour of an airscrew, and that the aerofoil theory when corrected for the interference of the blades in accordance with some very ingenious experimental work at the R.A.E. enables the form of a propeller to be designed with fair accuracy. But before a further advance can be made it is necessary to know more about the distribution of the air pressure over the blades. Experiments to determine this in the case of a model airscrew have been made by Mr. Fage, and the results will be before the Committee at an early date; there is little doubt that they will permit a further step in theory of great value. Meanwhile at the R.A.E. the apparatus for plotting the pressure over an airscrew in flight are well advanced, as also is the apparatus for measuring the thrust of the screw under the same conditions. More recently still a programme of tests on a family of propellers of varying pitch diameter values and varying aspect values has been laid down by a panel of the Aerodynamics Committee appointed for the purpose, and it has been arranged to give this programme precedence over all other airscrew tests in one of the 7-ft. channels at the N.P.L., while experiments on a reversible propeller are in progress. Among other airscrew questions is the effect of the high lift speed which is now reached. With various engines such experiments as have been made have shown that with a stationary airscrew as the top speed reaches the velocity of sound the character of the air flow round the propeller entirely alters; the slip stream disappears; the air appears to be drawn in at the centre and driven radially outward at the tips of the blades. Probably the thrust had almost entirely disappeared, and the propeller became very inefficient.

In wind channel work perhaps the most interesting investigation in the immediate future will be a series of comparative tests which is being arranged between the national channels in this country, America, France and Italy. Model aerofoils of standard section will be tested in all the channels, and it is hoped to include a test on at least one complete model. Details are now under discussion between the representatives of the various channels. M. Toussaint has made the very valuable suggestion that among the models should be at least one which has already been tested on the aerodrome track at St. Cyr.

Methods for facilitating or improving the accuracy of channel work are continually under discussion, and in connection with the demand for a full investigation into the stability of any new type of aeroplane methods for measuring the rotary derivatives have become increasingly important. Here again is ample room for research and investigation. Some further experience will show how, given the values of the coefficients, the necessary calculations can be best effected. Recent papers by Miss Cave-Browne-Cave and by Mr. Relf have thrown much light on this somewhat intricate matter. The importance of stability is generally recognised, and the researches now in progress as to the stability characteristics of many of the best-known types of aircraft are full of interest.

Another matter calling for attention is the investigation of the aerodynamic properties of special forms of wings, especially high lift wings. A number of interesting results have been attained. It remains to compare these, and possibly to extend them, in directions which may offer promise of advance. Aerofoils suitable for airscrew design also offer a field of useful investigation.

A problem to which the A.C.A. have recently devoted considerable attention is that of the prevention of fire on aircraft. It appears from the records of the Accidents Department that fires in the air are very rare; five were recorded in a period prior to December 31, 1918, during which over 500,000 hours were flown, while in the next six months the figures were four and 36,000 hours. The fires on crash vary greatly with the type of the machine, ranging from one in 35 crashes in one type to one in 4·4 crashes in another. A striking difference between rotary and stationary engined types of machines was noted, the latter firing four times as often as the other. Investigation showed that with rotary engines a fire-resisting bulkhead had almost always been inserted between the engine and the rest of the machine. This led the Committee dealing with the matter to recommend the insertion of such a bulkhead as a general rule. They have made other preliminary recommendations, and are continuing experiments with a view to improved safety. One obvious precaution is the use of a fuel having a much higher flash point than petrol. Thus there would be less tendency to catch fire through the tank bursting on crash and the fuel splashing over the engine or otherwise coming in contact with something capable of igniting it. A number of such fuels have been prepared and tested. They are all somewhat heavier than petrol and less efficient for equal weights, but the experiments are still in progress.

The question how fires occur on crash is one of difficulty. The tank usually bursts, and the petrol is splashed about. Sparks from the magneto may be a possible cause, and accordingly steps have been taken to secure that the high tension system should be reasonably safe and the magneto fireproof. Again, the liability to burst differs greatly in various types of tanks, and recent experiments have shown a reasonable probability of designing a tank which will not be unduly heavy in proportion to its contents, and yet will remain intact when a crash occurs.

A still other line of enquiry has been the attempt to provide a system of jets through which some fire-quenching liquid could be sprayed did a fire occur, and this, though not completed, has met with a fair amount of success. With a view to showing how effect could be given to the suggestions of the Committee an aeroplane at Farnborough has been modified so as to be practically immune from many of the risks common to other aircraft. The importance of all this to the safety of future passengers is very obvious, and there is ample scope for further work.

When dealing with fuel and engines, note should be taken of the experiments on engines bearing other fuels than petrol.

The phenomenon known as detonation is of importance in this connection, and the Engine Sub-Committee have in hand a series of experiments aimed at elucidating its cause.

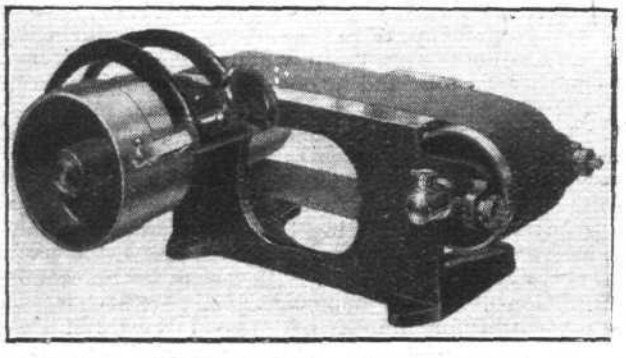
Reference has already been made to the report of the Load Factor Committee. This raises many questions which will need careful study and investigation. The endeavour to secure ample safety in all parts of the machine and the effort to reduce the dead load and increase the useful load pull in opposite directions, and are not always easy to adjust. Our knowledge is increasing continually, new materials become available, new methods are devised of distributing the material so as to reduce weight without impairing strength. All this means that if we are to progress we must investigate continually and be prepared as new facts appear to modify our former views and specifications.

I have shown, I hope, that from the standpoint of design and construction there is ample opportunity for investigation, and that the new Committee will not lack material for its work. But there are other questions of a different class. Let me mention one or two in conclusion. Can anything be done to reduce landing speed without reducing the top speed? The advantages are obvious. Professor B. M. Jones has recently called attention to these, and made some valuable suggestions for the investigation of the subject. Air brakes brought into action on landing are very inefficient; a reversible propeller otherwise satisfactory fails at the critical moment if engine failure compels a landing; some means is needed by which control may be maintained when the plane is at or close to the stalling angle, and this at present appears perhaps the most hopeful avenue of advance. Stability is also an important subject of discussion, and one on which skilled pilots differ. Its desirability for many purposes is admitted, and as I have already stated the stability characteristics of all new types are to be determined. In the case of many machines a reduction in load factor is permitted if the machine is stable, and there is no doubt that in comparing certain classes of machines the accidents are much greater among unstable than among stable machines. It appears probable that an unstable machine will usually have a stable position when flying inverted, but the whole question is a complex one and calls for fuller investigation. A stable machine has a will of its own, and the characteristics which give it this are in some degree opposed to those desirable for rapid manœuvrability. Accordingly among Service pilots there are many who prefer the unstable machine, and the decision as to the amount of stability to specify for fighting aircraft will need much consideration. A third and somewhat similar matter which needs discussion relates to the number of engines on a plane and the responsibility for running them. In most cases, I understand, the pilot has almost everything to do himself. With a single-engined machine the actions required are sufficiently complex. When he has to attend to four, in addition to steering the machine, the task is often almost beyond his power. On a submarine or destroyer the officer in command communicates his orders through the telegraph to the engineer of the steersman, and it may be that some system such as this may be required for aircraft; at any rate, the suggestion is one for the Committee to consider.

I have spoken long enough, and if in much that I have dealt with I may seem to have erred beyond the points of importance in the work of the Advisory Committee, I hope I have said sufficient to show that their work has been important, and that the legacy they are leaving to their successors is full of promise for fruitful work in the future.

THE AHCOL BAND POLISHING MACHINE

FOR grinding and polishing work a band machine offers some advantages over the emery disc, notably in the greater surface of the abrasive which is available, and also in the more



even speed at which it can be driven. A device of this type which has merits of its own is that known as the "Ahcol" which is being sold by Messrs. G. W. Dowding and Co., of 66, Victoria Street, London, S.W. 1. Its general arrangement is clearly indicated in the photograph reproduced herewith, and it will be seen that for belt-tensioning the makers have departed from the time-honoured practice of fitting a jockey-pulley, its function being performed much more satisfactorily by the positive adjustment operated by two milled nuts. This not only makes for smoother running, but it also enables the belt to be correctly tensioned for carrying out any particular work. It also enables the band to be run at the extreme edge of the table, should it be so desired. The construction of the machine is sturdy and yet not over-heavy, the bearings are long and generously proportioned, provision is made to render them dustproof, and lubricators of the screw-down type are fitted. To facilitate the grinding of angular work, a detachable and adjustable fence can be supplied. It is a matter of a few seconds to fit a new band, and for polishing with rouge or other abrasive powder, endless bands of leather can be supplied. The price of the machine is £5 10s.; the emery bands, which are woven without a joint, cost £1 4s. a dozen; the leather bands are priced at £1 each, and the adjustable fence is £1 7s. 6d. extra. Messrs. Dowding and Co. will be pleased to give any further details to anybody interested in grinding and polishing.

The Rome-Tokyo Flight

LIEUTS. FERRARIN AND MASIERO left Hsinyuchow at 8 o'clock on the morning of May 25, and arrived the same day at Seoul, in Korea. Osaka was reached on May 30, and the next day saw the voyagers at Tokyo, the end of their flight. The start from Rome was on February 14, the two pilots having kept practically together throughout the journey, the machines employed being Spa-engined S.V.A.'s.

A Baby Avro Takes Off for Australia

MR. B. HINCKLER, an Australian pilot, on May 31 made a start from Croydon Aerodrome at 4.50 a.m. on "Baby" Avro GEACO, with Australia as his final destination. This little 35 h.p. Green-engined machine should, if it gets through, be an interesting object lesson in the progress of long-distance flying. Had Mr. Hinckler had his way he would long since have had a try for the £10,000 prize which went to Sir Ross Smith and his companions. But the authorities thought it unwise to encourage any machine to start with a less flying radius than 1,000 miles. His contemplated mount at that time was a Sopwith "Dove." Apparently this adventurous pilot, who has calmly selected this method of "returning home" after demobilisation from the R.A.F., does not intend to rush his journey. It is to be a leisurely affair, and as he puts it quaintly himself, he intends *en route* to "have a good look at the world."

By Air to Australia.

ON Easter Sunday, Lieuts. Parer and McIntosh, the Australian pilots, were reported as crashed at Moulmein, on their journey from England to Australia. News of the resumption of their flight is now to hand. A telegram states that after a delay of six weeks owing to the non-arrival of a propeller which was supposed to arrived here on April 16, from the aircraft depôt at Lahore, they took the air successfully at Moulmein with a Caproni propeller kindly supplied by the Italian Government depôt and adapted to the machine. The Caproni is intended for a big Fiat engine, but the Siddeley Puma develops sufficient power to drive it, so raising its speed. The monsoon is blowing, but it is expected to get to Singapore in record time.

Bolivia Favours British

To those South American countries which have turned to Great Britain to aid them in their equipment of the new arm must now be added Bolivia which proposes to use British aircraft with British experts.

BOOK REVIEWS

ORGANISATION.

WELL-KNOWN as a designer of distinction, Mr. Howard T. Wright has now added to his accomplishments that of author. In his book, which has just been published by Messrs. Griffin, he has taken as his subject "Organisation as Applied to Industrial Problems." It is a subject to which he has given a great deal of attention, and it is probably not too much to say that his book promises to become *the* manual of the Works Manager. He tackles the subject very thoroughly, dealing, for instance, not only with the duties of the various officers of a manufacturing company, but also analysing the psychology of the men who should be selected for any particular job.

In this way there are chapters devoted to the General Manager, Co-ordinating Manager, Commercial Manager, Sales Manager, Purchase Department, General Office, etc. Mr. Wright also goes very thoroughly into the organisation of the various departments, such as the General Office, General Stores, etc., and gives specimens of the various forms, charts and diagrams which have been designed to assist in obtaining the utmost efficiency from the staff.

While Mr. Wright has dealt with what may perhaps be termed the technical side, he has taken care to give due prominence to the efficiency of the financial and commercial sides of a manufacturing concern, and shows how organisation can be applied there, and the importance of building that organisation on sound principles, if success is to be attained.

He does not claim for any of his suggestions that they are entirely novel or original; they are simply the result of observation and practical understanding over a busy and versatile business experience of some twenty-five years, and as such they should prove useful to many others who are confronted with similar problems.

The book is published by Messrs. Charles Griffin and Co., Ltd., at 21*s*. net.

ALUMINIUM.

THE use of aluminium is extending at such a rate, and, when lightness is aimed at, so many people instinctively think of this metal, that it is good to see that the literature on the subject is gradually extending. One of the latest books to be published is one in Pitman's Common Commodities and Industries series, which has been written by Mr. George Mortimer, M.Inst.Met.

In this volume, the author has aimed at an easy analysis of the processes through which aluminium passes in its metamorphosis from "common field mud" to the light silvery metal familiar to the reader. He arranges his book in two parts, one dealing with the history, distribution and production of aluminium and alloys, with a chapter giving hints on working the metal; while in the second part he shows some of the applications of aluminium in connection with automobiles and aeroplanes and the chemical and electrical industries, concluding with a brief note on marketing.

For those who are seeking information on the subject of aluminium, and do not want to go too closely into the matter, the book should be very useful. It is published by Sir Isaac Pitman and Sons, Ltd., at 2*s*. 6*d*. net.

R.F.C., H.Q., 1914-1918

EXCEPT for a few weeks at the end of 1914, when General Sir David Henderson was in command of the First Division, the Hon. Maurice Baring served practically continuously throughout the War with the R.F.C. and the R.A.F. in France. He was appointed a lieutenant in the Intelligence Corps attached to R.F.C. headquarters on August 9, 1914, and three days later he was in France. Thereafter, until the signing of the Armistice, he was kept busy making notes, memoranda, etc., of a most uninspiring order to judge by the samples he gives us; they referred to such things as the time taken to clean blue paint on rotary engines, gun drums being mixed up with engine parts, the inordinate request of a certain squadron for lorry cushions, the reasons for a superfluity of magneto boxes, etc.

Possibly as a variant to his duties—and his hobby, when there was a war on, of reading Dante's *Inferno*—he kept a diary, and the result is the very human book which has been published under the above title.

It does not pretend to be a complete history of the R.F.C. and the R.A.F. in the field, but it does give a very vivid insight into the doings of the Flying service. It contains very little about air-fighting, but there are many little word-sketches of the succession of officers who did such splendid work in, and for, first the R.F.C. and later the R.A.F. He is delightfully ingenuous in his description, as, for instance, of the dinner given by the Headquarters Third Wing to the owner of the château in which they were quartered. It was not surprising that after the succession of catastrophes which constituted the meal the guests thought the War would last a long time.

Again, in recalling his last visit to Major B. Barrington-Kennett, who did so much to establish in the R.F.C. a solid framework of tradition and sound principles, the thing he remembers is that Barrington-Kennett wanted to know how to cook a cauliflower. The book is sprinkled with many good stories, but we do not propose to quote any. For one thing, it would be difficult to pick out the ones to quote, and anyway it would be far better to buy the book and enjoy them all.

The book is published by Messrs. Bell and Sons, Ltd., at 8*s*. net.

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A Swedish Record

LIEUT. G. VON SEGEBADEN is reported to have lowered the Scandinavian height record on May 24 with an altitude of 6,200 metres in 48 minutes. As he carried no oxygen he thought it wise to finish his trip when he had recorded 28 per cent. of frost.

A Five-Seater's High Climb

WHAT looks like a world's record is announced from San Antonio, Texas. Lieut. Harry Waddington on May 30, on a De Havilland machine, climbed to 19,856 feet with four passengers on board, besides himself. This 3¾-mile stunt, if it is confirmed, beats Lieut. Rogers' 19,674 ft. climb in December last with two passengers, and also Poulet's 5,770 metres with three passengers on May 16, 1916.

A "Looping" Record

FRONVAL's latest "record" of 962 loops in 3 hrs. 52 min. 10 secs. made at Villacoubly on May 26, should stand for some time. Anyway it is so far in advance of his own previous best of 624 loops in 2 hrs. 42 min., that it is not likely to be challenged. The performance incidentally was a tribute to the strength of his Rhone-engined Morane-Saulnier machine.

Prague to Paris in Quick Time

CAPT. DEULLIN, M. de Fleurieu, and a mechanic, who recently flew from Paris to Prague and Warsaw, returned to Paris from Prague last week, the trip of 562 miles taking 5 hours 10 minutes. The pilot carried letters from the Polish and Czecho-Slovak Premiers to M. Millerand, and letters from the Prague Government to M. Benes, the Foreign Minister, who is at present in Paris, and to M. Deschanel.

Worthing Favours "Flips"

LAST season's flights having proved so popular the Worthing Council has concluded an arrangement for a seaplane service this season.

Martinsydes for Forest Survey

THE shipment to Canada of a number of aeroplanes for the special work of forest surveying is just being completed by Messrs. Martinsyde, Ltd. The possibilities in this direction of utilising the plane are enormous, and we are glad to learn that Messrs. Martinsyde, Ltd., are also starting on a contract for similar survey work in India. These machines are designed for both cargo and passenger carrying, and are fitted with interchangeable land-carriage and floats. Photography will form no minor feature of the equipment for this special work.

A Fireproof Tank

WE are informed by Mr. H. T. Hobbs that, at a recent Government test, a tank of his design was dropped from a height of approximately 400 ft., and it rebounded 25 ft. Although badly battered and bent, it is stated that no leakage of petrol occurred. The tank is a metal one and designed to be self-sealing, its weight working out to about 1 lb. 6 ozs. to the gallon. Although no details of the construction are yet available, we understand that the metal used is non-rustable and no rubber is used in the tank.

De Luxe Freights

CARRYING strawberries by aeroplane from Paris must be regarded as one of the luxury stunts worth paying for, in order to beat our home-grown berries by a day or so. Although Southampton sent up a first picking last Saturday, earlier in the week a consignment of 20 boxes came over from France *via* the air in an H.P. consigned to Mr. Charles Wilkinson. The carriage worked out at 1*s*. 3*d*. per lb., but this extra cost was more than compensated for in the advantage gained by the condition of the fruit from the small amount of handling.

THE ROYAL AIR FORCE

London Gazette, May 25

Flying Branch

Sec. Lieuts. to be Lieuts.—I. L. R. Large; May 7, 1919 (since demobilised). T. W. B. Mill; July 5, 1919 (since demobilised).

Pilot Officers to be Obs. Officers.—(Actg. Lieut.) D. E. Spalton; Nov. 6, 1919. H. S. Laidlaw; Feb. 4. Pilot Officer G. Le F. LaLonde to be Flying Officer; March 5. Canadian Cadet E. J. Nicolle is granted a temp. commn. as Sec. Lieut. (A.); Oct. 17, 1918. Flying Officer R. C. Mitchell (Lieut. R. Scots Fus.) relinquishes his temp. R.A.F. commn. on return to Army duty; May 7.

(Then follow the names of 20 officers who are transfd. to the Unemployed List under various dates.)

Wing Com. Sir H. A. Van Ryneveld, K.B.E., D.S.O., M.C., relinquishes his R.A.F. commn. and is permitted to retain rank of Lieut.-Col.; Feb. 1. Capt. R. O. Abercromby relinquishes his R.A.F. commn; June 5, 1919. The notification in *Gazette*, June 6, 1919, concerning Capt. R. O. Abercromby is cancelled. The notification in *Gazette*, Dec. 13, 1918, concerning Capt. D. S. Don is cancelled.

Administrative Branch

Sec. Lieut. P. Reed to be Lieut.; June 13, 1919. Pilot Officer W. Fell to be Flying Officer; Oct. 1, 1919. Flight Lieut. H. G. Hutchinson, M.B.E., is placed temporarily on the half-pay list on account of ill-health; Jan. 1 (substituted for notification in *Gazette* Jan. 16).

(Then follow the names of 4 officers who are transfd. to the Unemployed List under various dates.)

Pilot Officer T. Moorcroft relinquishes his commn., and is permitted to retain the rank of Sec. Lieut.; March 10. The notification in *Gazette* of March 26 concerning Sec. Lieut. T. Moorcroft is cancelled.

Technical Branch

Sec. Lieut. (Hon. Lieut.) T. L. M. Meares to be actg. Capt. while employed as Capt. (Grade B); Nov. 13, 1918 (since demobilised). Lieut. E. W. Lawrence to be Lieut. (Grade B), from (Ad.), and is graded for purposes of pay and allowances as Lieut.; Nov. 12, 1918 (substituted for notification in *Gazette* Oct. 14, 1919). Sec. Lieut. W. St. J. Littlewood, to be Lieut., Grade (A); June 27, 1919. Pilot Officer L. G. Shipcott to be Flying Officer, Grade (A); Oct. 1, 1919. Sec. Lieut. A. C. Hill to be Lieut., Grade (B); Feb. 3, 1919. Pilot Officer F. A. Osborn to be Flying Officer, Grade (B); Dec. 22, 1919.

Pilot Officers to be Flying Officers.—A. Blackwell, F. S. Chapman, J. Evason, S. Hobbs, F. Jezzard, J. B. Meikle, Maj. F. Morris (notification in *Gazette* Sept. 12, 1919, to stand). C. H. Paget (notification in *Gazette* Sept. 12, 1919, to stand). A. E. Thompson, T. J. E. Thornton; Oct. 1, 1919.

Sec. Lieut. E. F. Cameron to be Lieut. without pay and allowances of that rank; April 2, 1918 (since demobilised) (substituted for notification in *Gazette* April 6) (notification in *Gazette* May 31, 1918, to stand). Pilot Officers to be Flying Officers without pay and allowances of that rank.—B. C. Bennett (since demobilised), J. W. Wood (since demobilised); Oct. 1, 1919.

(Then follow the names of 11 officers who are transfd. to the Unemployed List under various dates.)

The following Lieuts. are placed on the retired list.—A. R. Caldicott, F. Wiltshire; May 26. Lieut. A. L. C. Fuller (Lieut., Dragoon Gds.), resigns his commn.; Sept. 26, 1919 (substituted for notification in *Gazette* Sept. 26, 1919).

Medical Branch

Transfd. to the Unemployed List.—Capt. G. C. Hall, Capt. V. L. Levy Capt. W. A. Pocock; May 11.

Dental Branch

Capt. J. Speak is transfd. to the Unemployed List; March 20.

Memoranda

Capt. D. S. Don is confirmed in rank as Capt.; May 20, 1918.

Sqdn. Leader A. L. C. Neame, O.B.E. (late Maj., R.E.) relinquishes his R.A.F. commn. on retirement from the Army, and is granted the rank of Lieut.-Col.; May 17. Sec. Lieut. H. W. Bender relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; May 1, 1919. The notification in *Gazette* of May 18 concerning Lieut. D. King is cancelled. The notification in *Gazette* of Dec. 31, 1918, concerning Capt. D. S. Don, is cancelled.

London Gazette, May 28

Flying Branch.

(Names are given of 19 officers who are transfd. to the Unemployed List under various dates.)

The following Lieutenants relinquish their commns. on account of ill-health and are permitted to retain their rank:—W. I. Crawford (caused by wounds) (Dec. 18, 1919) (substituted for notification in *Gazette*, Dec. 30, 1919); D. R. Brook, D.F.C. (contracted on active service) (May 21).

The notification in *Gazette* of April 20 concerning Sec. Lieut. C. A. Songhurst is cancelled.

Administrative Branch.

(Then follow the names of five officers who are transfd. to the Unemployed List under various dates.)

Technical Branch.

(Then follow the names of eight officers who are transfd. to the Unemployed List under various dates.)

Personals

Married

Maj. J. H. HERRING, D.S.O., M.C., R.A.F., I.A.C.C., only son of Mr. and Mrs. H. H. Herring, of Ashby, East Grinstead, was married on May 27, in London, to HONOR HARRATT, youngest daughter of the late Mr. and Mrs. DE SAINT.

To be Married

The engagement is announced of Maj. H. GRAEME ANDERSON, M.B.E., M.D., Ch.B., F.R.C.S., Surgical Consultant to the R.A.F., of 75, Harley Street, W., and GLADYS, elder daughter of CHARLES HOOD, of Hatch End, Middlesex.

The engagement is announced of Capt. A. J. BARLOW, late R.F.C., son of the late Ernest Arthur Lazarus-Barlow and Mrs. Lazarus-Barlow, of West Mersea, Essex, and Hyde Park Gate, and KIT, daughter of C. J. BOWEN-COOKE, O.B.E., and Mrs. BOWEN-COOKE, of Chester Place, Crewe, and St. Mawes, Cornwall.

The engagement is announced of Maj. D. C. S. EVILL R.A.F., and Miss HENRIETTA H. KLEINWORT, younger daughter of Sir Alexander and Lady Kleinwort, of 30, Curzon Street, W. 1, and Bolnore, Cuckfield, Sussex.

A marriage has been arranged, and will take place at St. Mary's Church, Hatfield Broad Oak, Essex, on June 22 next, at 2 p.m., between Maj. CHRISTOPHER JOHN GALPIN, D.S.O., late R.A.F., son of Canon F. W. and Mrs. Galpin, of the Vicarage, Witham, Essex, and Miss GLADYS ELISABETH SOUHAMI, of Mascot, Golders Green Crescent, London.

A marriage has been arranged, and will take place at 2.30 on June 19, at the Church of Our Lady of the Rosary, Marylebone Road, W., between Capt. REGINALD MUGLISTON, R.A.F., Merivale, Hatch End, Middlesex, and Nora, widow of EUSTACE LONERGAN, 8, Bryanston Mansions, Bryanston Square, W.

The engagement is announced of CHARLES E. WORTHINGTON, late 87th Squadron, R.A.F., son of Mr. and Mrs. C. T. Worthington, of Springfield Road, Leicester, and grandson of the late Israel Whetstone, and WINIFRED, the only daughter of Alderman W. J. LOVELL, J.P., Deputy Mayor of Leicester, and Mrs. LOVELL.

HONOURS

IN a supplement to the *London Gazette*, dated May 18, it was stated that the names of the following have been brought to the notice of the Secretary of State for War for valuable services rendered in connection with the military operations on the North-West Frontier of India, in East Persia and South Persia, during the period April 1, 1917, to May 31, 1918. To be dated January 1, 1919:

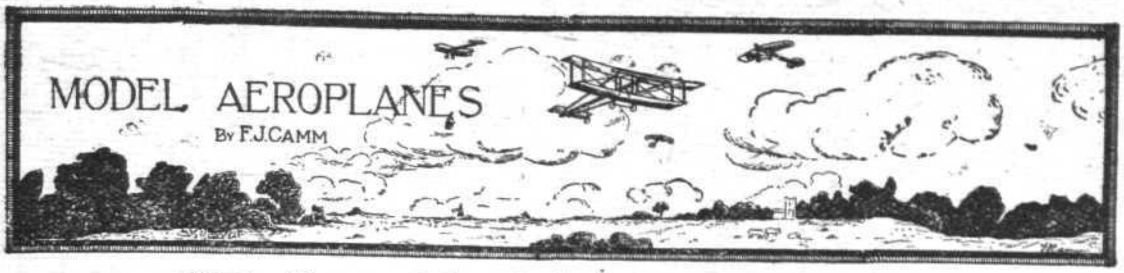
Royal Air Force.—Capt. J. M. Batting; Lieut. D. B. Cumming, 114th Sqdn.; Capt. O. Hughes, 31st Sqdn.; Capt. G. Mackrell, 114th Sqdn.; Capt. G. R. Travis, 31st Sqdn.

The King of Greece's Accident

THE motor-car accident in which the King of Greece's car collided with the Comte de Kergariou's car, has resulted in the death of the latter, who during the War served with distinction as an officer in the French Air Service.

A Fatality in Vancouver

A BRIEF message from Vancouver announces that Mr. E. H. Beazley, a member of a prominent shipping family and director of J. H. Welsford and Co., Ltd., of Liverpool, has been killed in an aeroplane accident there.

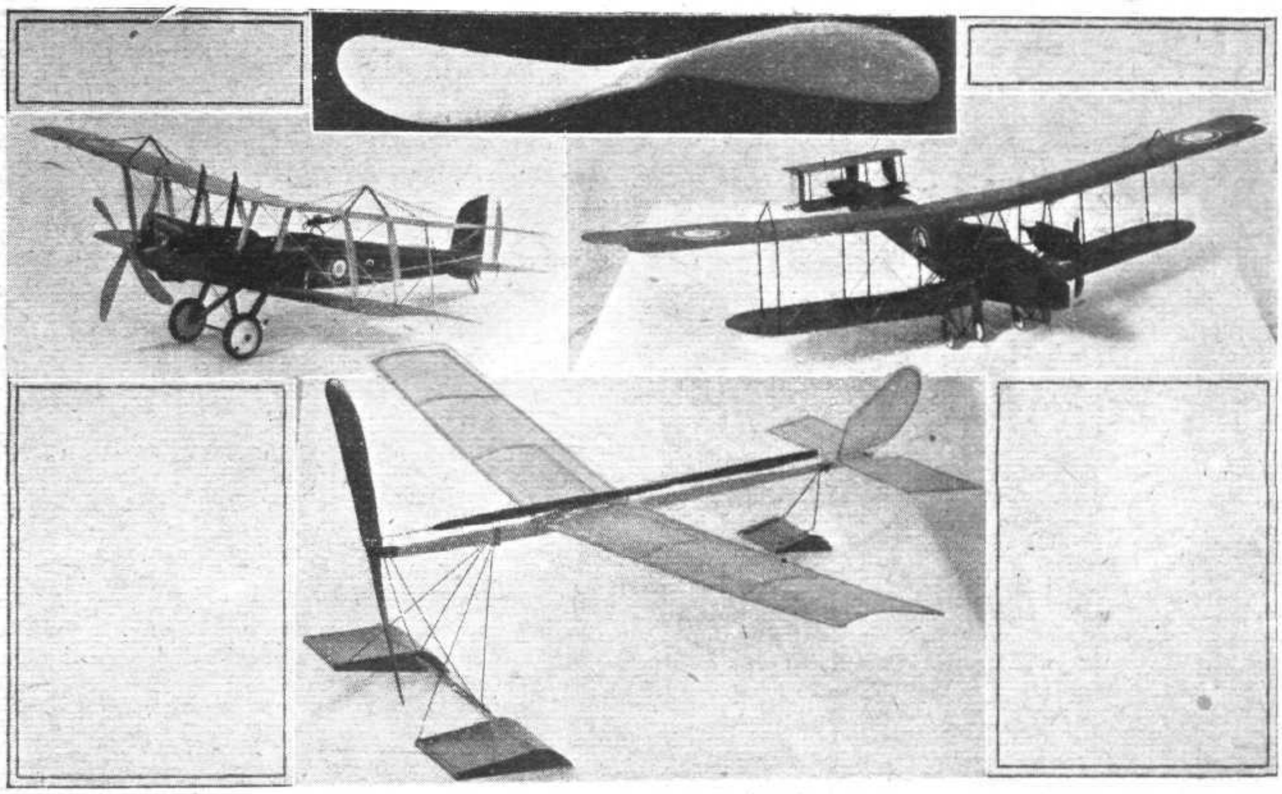


NOTE.—*All communications should be addressed to the Model Editor*

Some Paveley Products

THE photographs here given have been supplied by Mr. Paveley, of the D.A.P. MODEL AEROPLANE and ENGINEERING Co., 185, Replingham Road, Southfields, London, S.W. 18. One of the photos shows the scale Handley Page, with a span of 20½ in.; the colour and markings are also true to the prototype. The D.A.P. Co., by the way, are prepared to make scale models of any pattern machine, where particulars are available. Their list shows a variety of modern types at prices which are, we think, quite nominal. Other photos show the D.A.P. airscrews, a tractor hydro monoplane, and another of their scale products.

Mr. Paveley has promised us some photos and particulars of his compressed-air models and plants (of which Messrs. Gamage have the sole rights), which we shall be glad to publish. He will be remembered as one of those keen aeromodellists of pre-War times, with many good preformances by excellently designed machines, and now that he has turned to the commercial side of the subject, one feels sure that his business will be imbued with the same enthusiasm and soundness of design which actuated him in the old days. More power to his elbow!



Some Productions of the D.A.P. Model Aeroplane and Engineering Co.

Model Clubs

WE understood a short time ago that many of the model clubs were in process of re-formation. We have as yet heard very little from them. It seems singular, but they apparently prefer "to blush unseen" and obscure themselves from the achievements and progress of each other. We have nothing to say for the self-advertising quack, but we do say that it is something akin to foolishness not to let each club know what the other is doing. This result is only to be achieved by publicity. If we don't get reports, obviously we can't publish them, and just now, when the movement needs a stimulus, it is particularly desirable that results, reports and fixtures be sent to us. Will club secretaries please let us have these regularly and not spasmodically? We are at the present moment in communication with the R.Ae.C. regarding the revival of the K.M.A.A., and the correspondence will be published in due course. Meanwhile I should be glad if readers will acquaint me with their views on the matter, so that I can approach them with something tangible. One is at a loss to account for this apparent lethargy.

We are in a position to know that there is plenty doing in the model world, and we shall be glad to have photos., drawings (pencil ones will do), and any particulars of models. And (lest we forget) what about those club histories? Let us know how they are progressing.

A Club for Barnet

MR. DOUGLAS C. G. PLANK is endeavouring to form a model aeroplane club for Barnet and district, and he would be pleased to hear from anyone living in the district who would assist the movement. Mr. Plank's address is "The Firs," 81, Sebright Road, High Barnet, Herts.

The Handley Page Club

FROM Mr. A. Bertram Hudson, the Hon. Sec., comes a book of rules of the Handley Page Aero Model Club, the membership of which is not restricted to employés of the firm. The club is run on very progressive lines, and any aero-modellest in the Cricklewood and Hendon districts who is interested can obtain further particulars from Mr. Hudson, c/o Handley Page Athletic and Social Club, Cricklewood, N.W. 2.

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Sir Reginald H. Brade Joins Austins

BY the joining up of Sir Reginald H. Brade, G.C.B., late Secretary to the War Office and Army Council throughout the War, with the Directorate of The Austin Motor Co., Ltd., a great strengthening of this huge undertaking is assured. Sir Herbert Austin, the Chairman of the Company, should find a valuable colleague in Sir Reginald, to help him in the task of running this stupendous business.

SIDEWINDS

THE well-known East Anglian concern, Mann, Egerton and Co., Ltd., attained its majority last month. Founded in April, 1899, by the present Chairman and Managing Director, it has progressed steadily yet rapidly, throughout the intervening years, until today it is one of the largest and best known concerns of its kind in the British Isles. It is worthy of note that amongst the 1,200 employés of the company, over 50 have served the firm for periods exceeding ten years; over 20 for periods exceeding fifteen years; whilst 4 have served twenty-one years.

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IT is interesting to know that the aeroplanes constantly used by the King and Queen of the Belgians are fitted with K.L.G. sparking plugs. On their recent flight to London from Brussels, these plugs were also used, and it is worthy of note that Lieut. Jean Stampe, Aviateur to the King, and Lieut. Jacque Ledlier, Aviateur to the Queen, called on Messrs. S. Smith and Sons (M.A.), Ltd., and took back with them a gross of K.L.G. sparking plugs for future use.

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A MEMBER of a big commercial house arrived recently at the Cricklewood Aerodrome at 11 a.m. asking whether it was possible for him to get to Paris before the banks closed. A small machine was brought out, and within 20 minutes of his arrival the passenger was on his way to Paris, which was reached in 2 hours 10 minutes, so giving him ample time to conclude his business. The return flight of 2 hours was made on the following morning, the machine landing at Cricklewood Aerodrome at 9 a.m.

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SUCH an achievement as the recent record climb of a Handley Page could only be made possible by getting the utmost efficiency out of the Napier motors, and Messrs. C. C. Wakefield and Co., Ltd., announce that the lubricant used was "Castrol R," which thus adds one more to its long list of successes.

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THE 6,000 workpeople at the factory of Rolls-Royce, Ltd., at Derby, who, on Saturday, May 15, went on strike in consequence of the discharge of a man, returned to work on May 27. The man has not been reinstated.

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WITH an eye on the possibilities of aviation in Spain and the Spanish-speaking countries of South America, Messrs. Cellon (Richmond), Ltd., have got out a booklet in Spanish. Anyone interested can obtain a copy by applying to the firm at 22, Cork Street, London, W. 1.

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ON May 20 Mr. D. R. O'Donovan secured all the sidecar class records for the 100 miles, 150 miles, 1, 2 and 3 hours—so great an improvement on the previous "bests" that his new figures constitute records for not only his own class (500 c.c.), but for engines up to 1,000 c.c., a remarkable achievement when one considers the size of the Norton engine. Mr. O'Donovan relied exclusively for his ignition on the C.A.V. All-British Magneto, a splendid testimony to the reliability of Messrs. C. A. Vandervell's product.

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MESSRS. SIMPSON AND TREGILLES write us that they have started in business for the manufacture and sales of Aircraft, etc., at 59, Palmerston Street, Perth, West Australia. They will be glad to receive communications from Manufacturers of Engines, Parts, etc., and any other matters pertaining to Aeronautical business.

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MESSRS. BARIMAR, LTD., scientific welding engineers, of 10, Poland Street, London, W. 1, announce the opening of new branches that will effectually cover the Indian Empire, including Burma and Ceylon. Headquarters have been established at 156, Dharamtala Street, Calcutta, and a full equipment of the latest welding and machining plant, including portable electric apparatus for marine and other engineering repairs has been installed. Effective steps are also being taken to operate complete plants of every known and approved welding process at Delhi, Bombay, Madras, Karachi and Burma. These new engineering concerns are being financed exclusively with Anglo-Indian capital, and they will be run by Anglo-Indian business men, with the technical aid of British experts who are shortly sailing for India. In addition, the engineers will intensively develop the Barimar metallurgical process for restoring scored bores and defective castings, which has been elaborated by the Barimar staff with the aid of some of the best-known British metallurgical experts. The overseas branches recently established by Barimar in South Africa and France are running very successfully, and new branches are now being formed to cover all Australasian territories, under the personal supervision of Col. O'Donnell.

COMPANY MATTERS

Triplex Safety Glass Co., Ltd.

THE following additions have recently been made to the board of the Triplex Safety Glass Co., Ltd. :—

Mr. Clarence Charles Hatry, managing director, Commercial Bank of London, Ltd., director of the following :—British Glass Industries, Ltd., British Window Glass Co., Ltd., Leyland Motors, Ltd., Agricultural Industries, Ltd., C. A. Vandervell and Co. ; Sir Francis Towle, director of the following :—British Glass Industries, Ltd., British Window Glass Co., Ltd., W. Dennis and Sons, Ltd., Kent Portland Cement Co., Ltd., Webb's Crystal Glass Co., Ltd. ; Mr. Percy Jose Mitchell, managing director, British Window Glass Co., Ltd., director of the following :—British Glass Industries, Ltd., Colonial and Foreign Glass Industries, Ltd.

PUBLICATIONS RECEIVED

Report No. 72. Wind Tunnel Balances. The National Advisory Committee for Aeronautics, Navy Building, 17th and B. Streets, N.W., Washington, D.C., U.S.A.

B. 14. By R. K. Weekes. London: George Allen and Unwin, Ltd., Ruskin House, Museum Street, W.C. Price 7*s.* 6*d.* net.

Eastern Nights—and Flights. By "Conacts" (Alan Bott). London: Wm. Blackwood and Sons, Ltd. Price 7*s.* 6*d.* net.

The Problem of Dock Labour. By Arthur Shadwell, M.A., LL.D. London: Longmans, Green and Co. Price 1*s.*

Organisation as Applied to Industrial Problems. By Howard T. Wright. London: Charles Griffin and Co., Ltd. Price 21*s.* net.

Airplane Photography. By Herbert E. Ives. J. B. Lippincott Company, 16, John Street, Adelphi, W.C. 2. Price 18*s.* net.

Catalogue

The X-Ray Examination of Materials. The Cox-Cavendish Electrical Co., Ltd., Twyford Abbey Works, 84, Acton Lane, Harlesden, N.W.10.

AERONAUTICAL PATENTS PUBLISHED

Abbreviations: cyl. = cylinder ; I.C. = internal combustion ; m. = motor

APPLIED FOR IN 1918

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published June 3, 1920

1,616. CLERGET, BLIN ET CIE. Cylinders. (142,518.)

APPLIED FOR IN 1919.

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published June 3, 1920

3,535. H. N. HASLER. Mooring apparatus for airships. (142,573.)

7,465. VICKERS, LTD., SIR J. MCKECHNIE and A. RYAN. Airship fabrics. (142,615.)

12,792. WILLOWS AIRCRAFT CO., E. T. WILLOWS and W. J. AUSTIN. Life-saving floats. (142,672.)

NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

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6 " " ..	14	1	6 " " ..	16	6
12 " " ..	28	2	12 " " ..	33	0

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